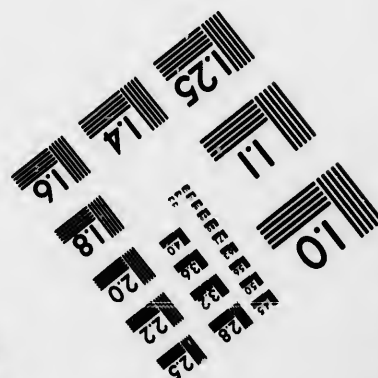
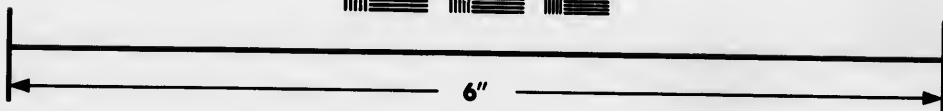
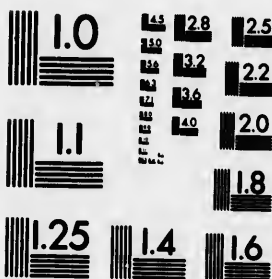


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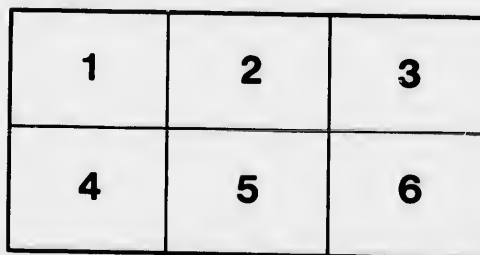
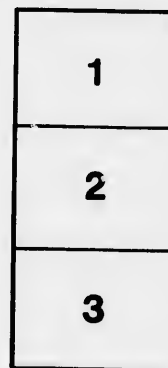
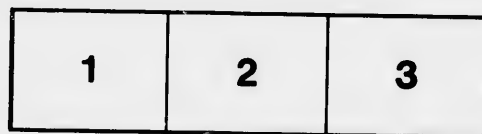
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GEOLOGICAL AND NATURAL HISTORY SURVEY OF CANADA
ALFRED R. C. SELWYN, LL.D., F.R.S., DIRECTOR.

REPORT
ON THE
G E O L O G Y
OF
NORTHERN CAPE BRETON.

BY
HUGH FLETCHER, B. A.



PUBLISHED BY AUTHORITY OF PARLIAMENT.

MONTREAL:
DAWSON BROTHERS.
1884.

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ALFRED R. C. SELVYN, Esq., L.L.D., F.R.S.,

Director of Geological and Natural History Survey of Canada.

SIR:—The report presented herewith describes the work of the seasons of 1880-81-82, and relates to that part of the island of Cape Breton which lies north of Judique and River Denys Basin in Victoria and Inverness counties and which has not been described in previous reports.

To obtain materials for the construction of a map of this region, detailed surveys were made as in former years, the courses being taken by prismatic compass and the distance being measured on the roads by the odometer, and in the brooks by pacing. Some of these surveys were plotted on a scale of twenty chains, and the remainder on a scale of forty chains to an inch; all were afterwards reduced by the eidograph to a scale of one inch to a mile. Certain points were adopted from the Admiralty charts of the coast, and between these our surveys were laid down. The long rivers in the north are only approximately correct, as they were surveyed by pacing in a very rough country, by several different persons, and without a connecting base line, except on the shores. To expedite the survey of these rivers, main camps or depots for provisions were established at the headwaters of the N.E. Margaree, the North River of St. Ann's and the West river of Buldeck, thence traverses were made down the neighboring brooks to the settlements, and thence back again to the camps.

In preparing the map I was aided in 1880 by L. R. Ord, D.L.S., and in 1882 by E. R. Faribault, C.E. My assistants in the field work were William Fletcher, B.A.,* D. M. Christie and Dr. McPhedran, John McMillan, Professor Fletcher, A. Armstrong, B.A., and E. W. Sawyer, B.A., E. R. Faribault, C.E., J. A. Robert, A. Hare and M. H. McLeod.

To the gentlemen named below our thanks are due for many acts of kindness, hospitality and assistance:—Malcolm McLeod, Kenneth McKay and William R. McKenzie, Big Intervale; Joseph Ingraham,

* Unfortunately drowned on Nov. 5th, 1881, while fording the Northeast Margaree River, at Big Intervale.

Northeast Margaree; John Y. Gunn, school inspector, Donald McKay, Isaac McLeod, George McLeod and Squire McLennan, Strathlorne; Rory McLennan, Upper Middle River; Philip McDonald, Indian Rear, Whycoconagh; Lieut.-Col. Bingham and Alex. McLeod, Englishtown; Donald McLeod, North River St. Ann's; Sheriff Dunlop, Alexander Cameron, Hon. C. J. Campbell, M.P., and Judge Tremaine, Baddeck; Angus McLean and M. Doherty, Lake Ainslie; Thomas E. Fraser and Dr. Cameron, M.P., Mabou; A. B. McDonald, Meat Cove; Rupert G. Zwickler, Timothy Y. Nichols, Angus McDonald and Rev. J. McNeil, of Cape North; Angus McIntosh, Pleasant Bay; Reuben Phillips, Walter Lawrence and Henry Ladd, Cheticamp; Fred. S. Brown, John Dauphincy and Rev. Peter Forgeron, Ingonish; Archibald McDonald, Mabou Coal Mines; Thomas Evans, Chimney Corne; James McFarlane, S.W. Margaree; Joseph LeBlanc, East Margaree; Henry Taylor, Margaree Harbor; Rev. George McAulay, Port Mulgrave; Hon. John Bourinot, Hon. E. T. Moseley, S. E. Burchell and H. C. Burchell, Sydney; Marshall Bourinot, Hawkesbury; Alexander Wright, Moncton; E. G. Millidge, C.E., and Sheriff Hill, Antigonish, and James H. Austen, Halifax.

I have the honour to be,

Sir,

Your obedient servant,

HUGH FLETCHER.

OTTAWA, 1st June, 1883.

Donald
, Strath-
l, Indian
English-
p, Alex-
ne, Bad-
E. Fra-
t Cove;
Rev. J.
Reuben
red. S.
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l, Anti-

REPORT

ON THE GEOLOGY OF

NORTHERN CAPE BRETON.

TOPOGRAPHICAL FEATURES.

The country presents a very varied surface. On the western coast as far north as Cheticamp, on the borders of the Bras d'Or Lake, in the valleys of Lake Ainslie and of the Mabou, Broad Cove, Margaree, Skye, Middle and Baddeck Rivers, it contains the best farming land in Cape Breton, productive, thickly-settled and seldom rising to a great height above the sea, whereas the northern, or Cape North district, is high, sterile and uninhabited, except at certain points on the coast and for some miles up the rivers flowing into Pleasant, St. Lawrence, Aspy, Ingonish and St. Ann's bays. Outside these settlements this northern region is but little known, being intersected by wild, rocky gorges, through which streams with numerous falls flow from the barrens, marshes and small lakes in which they originate. They present, however, the best means of exploring the country, and some of them, like the North Aspy, Black, Ingonish, N.E. Margaree, St. Ann's, Barasois, and Indian Rivers, are easily followed in the dry season, whilst the Cheticamp, for ten or twelve miles of its course, and in several of its tributaries, flows in gloomy, dangerous and all but impassable defiles, shut in by high mural cliffs.

Character of
the country.

Rivers fit for
exploring the
northern
wilderness.

The same difference exists between the northern mountainous and the southern cultivated districts, in the prevalence of certain rock formations, as elsewhere characterizes such differences in surface aspect, the latter being underlaid by Carboniferous strata, with the exception of a few isolated Pre-Cambrian hills, also for the most part cultivated

Dependence of
the aspect of
the country on
its rocks.

R.

because they are in the Carboniferous area; and except in the valleys mentioned above, the whole northern peninsula is occupied by Pre-Cambrian rocks.

A fringe of Carboniferous rocks occupies all the outer coast, except near Cape Mabou, between Cheticamp River and Pleasant Bay, between Poulet and Lowland Coves, at Cape North, between White Point and Ingonish, at Smoky Cape and parts of St. Ann's Harbor and the Great Bras d'Or, where the older rocks come bluffly to the ocean.

Owing to the different distribution of the rocks the hills are not arranged with the same regularity and parallelism as in the eastern and southern portions of the island. The Cape North district has been described by Mr. John Campbell in his report on the Nova Scotian gold fields, 1865, as an elevated plateau having a mean altitude of 1200 feet above the level of the sea, and attaining at some points an elevation of 1500 feet, comparatively level, although cut by deep valleys and narrow defiles along all its water courses, and supported toward the shores by a bold rampart of rounded or conical mountains. This description is true; but it must at the same time be borne in mind that very little of the land is quite level, the hilltops and barrens being of small extent, while the brooks and defiles are very numerous. Special reference will be made in the course of this report to the characteristic scenery, and other features of interest connected with different parts of the country.

Campbell's
description of
Cape North.

GEOLOGY.

The geological systems met with correspond with and are, indeed, the extension of those described in the Report for 1879-80, namely:

Classification of
rocks.

- A. B. Pre-Cambrian. { Syenitic, Gneissoid and other Felspathic Rocks.
 { Crystalline Limestone.
- G. Carboniferous. { 1. Lower—Conglomerate, Limestone.
 { 2. Middle—Millstone Grit, Coal Measures.
- M. Post Tertiary.

A. B.

PRE-CAMBRIAN.

Syenitic, Gneissoid and other Felspathic Rocks.

Pre-Cambrian
areas.

In the southern part of the district, small areas of Pre-Cambrian rocks occur at Whyecomagh, Mullach, Bucklaw, Lake Ainslie, Cape Mabou and Middle River. A large area, beginning at the east branch of Trout Brook, extends west in tongues to Lake Ainslie and north to Lake

Law;* and to the eastward of Lake Law begins the main area, which extends to the northward, and joining others from Margaree and Cheticamp, at length occupies the island from shore to shore. As will be seen in the sequel, there is even greater variety in the character of these rocks than in other parts of Cape Breton.

Whycocomagh and Mullach Felsites.—Coarse red syenite, often micaceous, occurs in various parts of Skye Mountain. Northeast from this mountain and separated from it by Skye River, is a patch of diorite and felsite, surrounded by Carboniferous rocks; and about a mile further the Mullach area, is in part occupied by crystalline limestone, quartzite and other banded rocks and partly by syenite and felsite, well exposed in the brooks flowing into Glen Ainslie and the head of the lake. Compact and granular quartz-felsite are found in McKay's mill brook, with syenite and epidotic felsite.

The Salt Mountain, east of Whycocomagh, seems to consist entirely of conglomerate, but that it has probably a nucleus of older rocks is shown in the brooks to the eastward. On the shore, about two miles further east, felsite and diorite appear in two outcrops; and at the shingle mill beyond, underlying sandstone and conglomerate, there are grey and light-colored felsites and quartz-felsite in thick beds, fine, strongly coherent laminae, containing talc, with calcspar and serpentine in the numerous joints, which dip S. 55°, E. < 50°. These form a fall 18 feet high. They resemble certain Coxheath rocks, but are more micaceous and schistose. The quartz is often distinct, in irregular blotches and veins.

Bucklaw Felsites.—Among the sandstone and grit of the cross-roads on the north side of Little Narrows, banded, contorted and slightly micaceous quartzite and quartz-felsite form numerous rocky falls.

Near the shore, several knobs of Pre-Cambrian rock come through the conglomerate; and in McPhedran Brook and other streams of the neighborhood, grey, sparkling, compact quartzites and banded quartz-felsites, sometimes assuming a columnar form, are cut by veins up to four inches thick, of quartz holding iron pyrites. The quartz-felsite passes into granite or compact syenite and syenitic gneiss with small specks of hornblende. In another brook, grey, fine granite with silvery or black mica and greenish-grey fine diorite underlie conglomerate and reddish-grey grit. The Bucklaw area does not extend to Hume River, but its northern boundary is undefined. On top of the mountain, pits have been sunk in the quartzites in search of gold.

* A corruption, as I am informed by Mr. Samuel Macdonnell, O.C., of Port Hood, of *Luguelaw*, the name of a small village in Wicklow County, near the gloomy and romantic Glendalough, the scene of one of Moore's Irish Melodies.

Felsites of the South Side of Lake Ainslie.—Separated from the Mulach area on the northwest by the beautiful Ainslie Glen is another wooded hill of red and reddish-grey syenite, brecciated quartz-felsite and felsite, bounded on the east by Lake Ainslie, of which it forms the shore for about two miles, and on the southwest and north by two large brooks.

Mabou Felsites.—On the highlands, which stretch from Mabou Harbor to Broad Cove and attain an altitude of 1000 feet, felsite, quartz-felsite, syenite, diorite, aluminous shales, porphyry, breccia and other rocks, which might be described in exactly the same words as those of the Coxheath hills,* underlie Carboniferous conglomerate, grit and sandstone. These have been carefully traced and examined in the beautiful valleys of this region. At the most southerly point, on the hill behind McMaster's forge, the rock is a bright red porphyry, like that of the Coxheath "big barren." In a beautiful glade and pass, between the headwaters of branches of Rankin and McAulay Brooks, shales like those of Louisburg are mixed with syenite, while a few blocks of limestone, probably Carboniferous, also mark the former extension of rocks which run far up many of these glens. Below this pass, in Rankin Brook, similar outcrops occur; but in another tributary, finely foliated hornblende-gneiss passes into compact, banded, splintery felsite, like that of Capelin Cove, associated with diorite.

Obscurely gneissic rocks in other brooks dip as shown on the map. In a branch of Broad Cove River they are corrugated and micaceous, blotched and streaked with milky and light-brown quartz.

At Mabou Coal Mines, grey, pearly, graphitic mica-schist, felsite and quartz-felsite, veined with quartz, contain also hornblende, chlorite, calcite and hematite; and pits have been dug in a dark, friable, graphitic felsite, which on weathering resembles slack coal. The mill brook displays fine bluish-grey porphyritic, hematitic and jointed, Coxheath felsite, passing into fine-grained, flesh-colored syenite, with a small percentage of hornblende. The scenery of the Mabou highlands is justly admired, the glens on both sides of the range being very beautiful, and the hills coming steeply to the sea in imposing headlands.

Lower Middle River Felsites.—Another felsite area lies west of Middle River, between the east branch of McNaughton Brook and the Gairloch Mountain road. At the iron mine in Lauchlin McQuarrie's clearing, and in the brook below, quartzite and soft, greenish chloritic schist are in contact with conglomerate and grit. In Black Brook, below its confluence with this stream, occur compact, granular and

Similarity to
the felsites of
Coxheath.

Rankin and
McAulay
Brooks.

Broad Cove
River.

Search for coal
in graphitic
felsite.

Mabou
Highlands.

Gairloch
Mountain iron
mine.

* Report for 1875-6.

brecciated, red and grey quartz-veined felsite, pearly, feldspathic schists, and fine, fragmentary Louisburg shales, with great pieces of compact flinty felsite or porphyry, which weather white and show their granular or fragmentary structure on the surface, like the breccias of Coxheath and Louisburg. These fragments yield traces of copper pyrites and green carbonate, as well as of epidote and iron ore. Above the confluence of McKenzie Brook, the Carboniferous conglomerate and sandstone are succeeded by banded felsites and Louisburg shales, pearly and contorted, often micaceous and serpentinous. The wild and beautiful falls at the contact are easily accessible from McKenzie's mill.

Traces of copper and iron ores in the fragmentary felsites.

Falls.

The most northerly outcrop in this area comprises the soapy, feldspathic shales seen on the Gairloch Mountain road where it begins to ascend the hill. In McNaughton Brook, dark greenish, granular chloritic diorite occurs.

A second Precambrian boss.

A smaller patch of banded felsite, breccia and diorite is seen in the Black Brook valley west of that just described.

East Lake Ainslie Felsites.—Several areas or tongues of Pre-Cambrian rock, the extent of which is shown on the map, occupy the eastern side of Lake Ainslie and nearly connect the Mullach areas with the larger one further north. They consist of compact and granular felsite, quartz-felsite, syenite and diorite.

Big Brook, Middle River and Lake Law Area.—A belt of Pre-Cambrian rocks, of variable width, extends from the head of the east branch of Trout Brook nearly to Northeast Margaree, the southern portion of which displays syenite, purple vesicular porphyry and other felsites on the Gairloch Mountain road. Where the Black Brook cuts this belt, compact porphyritic felsite and vesicular and amygdaloidal trap, veined and blotched with epidote, quartz and calcite, stained with hematite, and evidently of igneous origin, are in contact with bright red and purple, fine, Carboniferous sandstone, grit and conglomerate, dipping S. 5°, W. < 25°. The amygdules, sometimes $\frac{3}{4}$ -inch long, consist of calcspar, feldspar and chlorite, spotted with carbonate of copper. Higher up the brook there are compact and fine-grained hematitic felsite and diorite of reddish or brownish colors, like those of Cape Rhumore. Above the falls which these give rise to, grit again comes in.

Black Brook, Trappean and epidotic rocks.

Stains of iron and copper.

In ascending McKenzie Brook above McKenzie's mill at the Gairloch road, grit and conglomerate composed of syenite debris occurs for some distance, followed by sandstone in contact with beautiful greenish, reddish and grey compact Coxheath shales, reddish and greenish, mottled, fine-grained trappean rocks, like those of Cape Rhu-

McKenzie Brook.

more, and mottled, epidotic felsite and diorite, with hematite in the joints. In the gorges and ravines further up there are coarse varieties of diorite, and these are associated with compact, grey, porphyritic felsites in the branch which flows from Malcolm McDonald's mill.

Hematitic syenite, often gneissic, prevails in McRae Brook, but laminated, pearly, micaceous and talcose felsites also appear. On the barren between the head of this brook and Pine Brook the syenite is coarse and reddish.

Barrens
between McRae
and Pine
Brooks.

In Morrison Brook, syenite and diorite, all more or less chloritic and quartziferous, are associated with the mica schists of the Middle River gold brooks. In the north branch the gold-bearing rocks, as well as cliffs of quaternary gneiss and red compact quartz-felsite, are succeeded higher up by red syenite. In the south branch are dark, massive, finely crystalline diorite or pure hornblende rock; red and grey compact or granular, flinty felsite and quartz felsite, obscurely banded, in which the quartz is often distinct as veins and blotches, or forms minute crystals in cavities of the compact rocks, and bluish-grey syenite in which hornblende is abundant.

Morrison Brook
gold-bearing
rocks.

In the little brooks of the Lake Law valley similar rocks are frequently seen underlying the Carboniferous strata, and also on the western slope of this inlier.

Lake Law.

In descending Tompkins Brook from the barren out of which it rises, schistose rocks are succeeded by the syenite which forms the steep, red face of the Round Mountain. In Angus Brook and other neighboring streams, syenite, hornblende schist, laminated felsites and diorite occur with other rocks, while in Pine Brook syenite prevails, as well as in the brook to the southward and Coady Brook, in both of which, however, it is succeeded in the lower part by hornblende schist, laminated felsite, quartz felsite and epidotic, calcareous diorite, holding masses of flinty quartz.

Tompkins'
Brook.

Mount Pleasant Brook, a succession of falls and cascades, cuts another ravine through massive diorite, showing great variety of texture; pyritous slates, like those of Middle River; grey, flinty, Coxheath felsites, syenites and chloritic rocks, enclosing masses of milky quartz several feet in diameter. Numerous outcrops of felsite, syenite and diorite underlie Carboniferous grit and conglomerate in the Matheson Glen and Cooper Brooks. Cobb's Brook displays, near the fork, dark, banded syenite and glittering, crystalline quartzite. In one branch, dark grey amygdaloidal trap occurs in small knolls, and being coated with hematite, which gives a metallic lustre to its surface, attempts have been made to work it as an iron ore. Similar rocks are again seen in contact with Carboniferous strata further up Lake Ainslie. The traps which seem to be confined to the neighbor-

Mount Pleasant
Brook.

Iron ore.

hood of this contact are, perhaps, all of Carboniferous age, but have not been separated from the Pre-Cambrian.

In the south branch of Glenmore Brook, immediately north of the Gillanders Mountain road is a small inlier of red, fine syenite, with quartz in small crystalline aggregations, in vugs, associated with dark-bluish-grey hornblende felsite, stained with hematite. At the bridge on the Gillanders Mountain road, banded felsite containing hornblende, mica and quartz, dips S. 63°, W. < 45°, and higher up are felsite, quartzite, quartz-felsite and syenite. To the northward of this brook the felsite has not been traced, but it does not reach the road, and perhaps, as in other cases, is confined to the valley of the brook, which has thus been cut down through the covering of Carboniferous rocks. Higher up, the brook, which is a fine open one, cuts through reddish-grey, coarse, Carboniferous grit.

On the east side of Lake Ainslie, between the church and the end of the Gillanders Mountain road, the felsite in the hill is red and compact, like that of Coxheath. On the Gairloch Mountain road, near the lake, it is bluish-grey.

At the head of the north branch of Trout Brook, where it crosses the Gillanders Mountain road, calcareous amygdaloidal trap of various colors is found; and near the lake, coarse, heavy-bedded, red, chloritic syenite, weathering purple. The valley is here a quarter of a mile wide, wooded with beech, small spruce and black birch, and the bed is bouldery gravel.

Northern Pre-Cambrian Area.—This area, the boundaries of which have already been described in a general way, extends from Hunter's Mountain, near the mouth of Baddeck River to Cape North, and long spurs stretch from it into the Carboniferous country of St. Ann's and Baddeck. It is separated from the St. Ann's felsite area on the coast by a narrow, beautiful glen, and from that of Middle River by the Lake Law valley, where the closeness of the hills (not more than half a mile apart), their height and beauty, and the presence of several deep lakes, give rise to weird and magnificent scenery.

This northern area is everywhere high, rugged and uncultivated. Within it are the gold mines of Middle River and the copper mines of Cheticamp and St. Ann's. The rocks comprise every variety of felsite, syenite, granite, schist, gneiss, etc., which may hereafter be shown to belong to more than one series; hence a somewhat minute description may not be out of place. Beginning at the south, these rocks are traversed by the Crowdis Mountain road, and by Rice, Harris, Adelaide and other brooks, which expose greenish granular syenite, diorite and felsite. Similar rocks occur in the lower part of McRae

Glenmore Brook.

East side of Lake Ainslie.

Trout Brook.

Beauty of glens of St. Ann's and Lake Law.

Gold and copper mines.

Rocks of Hunter's and Crowdis Mountains.

- Brook, nearer Middle River, whereas at the head, gneiss and mica schist prevail. In the next brook to the northward the felsite in one place shows bedding, but is succeeded higher up by massive diorite. For about four miles from its source the north branch of Baddeck River, flowing through hay marshes in small creeks and ponds, displays few outcrops; it then becomes rapid and in the lower part is rough with gorges, beautiful cascades and deep, dark pools. At its head, blocks of mica schist are found in the hills; near the camp, felsite and greenish, fine diorite, succeeded lower down by greenish-grey syenite and fine, obscurely bedded hornblende, and other slaty rocks. Three miles below the camp, diorite appears in cliffs, with gneiss and banded felsite, capped near the settlement by Carboniferous rocks.
- Near the springs at the source of Sam's Brook, a clear, cold stream at the head of New Glen settlement, bluish-grey gneiss and mica schist are found; while lower down steep cliffs and cascades of red syenite and dark-greenish diorite are cut by threads of quartz. Grey coarse syenite and diorite underlie Carboniferous rocks in the little brooks on the opposite side of this glen, which is fertile and well-cultivated, and are associated in the main brooks with obscurely laminated rocks, containing masses of quartz. Above a very pretty twenty feet fall, with a fine trout pool below it, the brook runs through narrow, sloping alder-marshes and level, scraggy spruce land. All the Baddeck rivers are celebrated for trout and salmon, the glens are picturesque, and a magnificent view can be obtained from the top of Ben Breac (Spotted Mountain), at the head of Big Glen.
- In the Northeast Baddeck River, as far as its source above the lakes, syenite predominates, blocks of which also occur among the gravel on the shore of the lakes, which are often visited by fishermen. In Christopher McLeod's Brook, bluish-grey, very quartzose gneiss, stained with hematite, succeeds the Carboniferous rocks, and in the first small tributary contains lenticular veins of quartz. On the path from Big Glen to the North River of St. Ann's, and in the brooks crossing it, syenite and diorite are well exposed, with an occasional outcrop of gneiss. The eastern boundary of the syenite, felsite and quartz-felsite of North Gut and Goose Cove Brook is probably more irregular than shown on the map, none of the brooks having been followed into the Pre-Cambrian area.
- Scarcely less beautiful than the glens of Baddeck are those of the North River and Tarbet. In John McDonald's Brook, the first branch of North River, the highest rapids near the small lakes show coarse syenite. Lower down, are pearly, micaceous and chloritic schists, greenish fine diorite, laminated felsite and quartzite in great falls and cascades. Among these also occur the rocks described in the Report

Baddeck River.

New Glen.

Ben Breac.

Northeast Baddeck River and lakes.

Quartz veins.

North River of St. Ann's.

for 1876-7, p. 427. On the right bank, a short distance above John McDonald's house, is a high, naked, rocky peak.

Above the camp, in the middle branch of the North River of St. Ann's, and in the adjoining branch of the Northeast Marguerite River, micaceous and hornblende gneiss and mottled red and yellowish, compact, obscurely banded felsite with scales of mica accompany coarse, grey granite. In the small tributary half a mile above the camp occurs a bluish-grey hornblende gneiss meshed with felspar veins. Mica and hornblende schists, diorite and syenite, with veins of white quartz, sometimes several feet thick, for nearly four miles below the camp occupy North River to a large branch from the westward, where it is still near the level of the surrounding country, but below which it is turbulent- the gneisses giving place to red and grey coarse syenite, both in the river and its tributaries. But with the coarsest syenite are often intimately associated quartziferous schist, gneiss and quartzite. At the head of the branch above mentioned, blocks of bluish-grey, very quartzose gneiss are found; lower down, chloritic schist and quartzite, with a northeasterly strike; while for a mile above the main river, syenite is in place.

In the east branch of North River similar alternations occur, and one of the finest falls in the country, about three miles above the fork, is over bluish-grey and reddish diorite and syenite, which also continue to the labyrinth of ponds, marshes and creeks out of which this branch issues.

In the west branch, syenite, diorite and mica schist occur. Here, also, about one mile from the settlement, there are a magnificent fall and wild cascades, above which the river, being sluggish, yields few exposures.

Below the confluence of these three branches several bosses of Precambrian rock lie in the bed of the river among red Carboniferous conglomerate and sandstone, which, near the church, are associated with grey flaggy sandstone holding carbonized plants.

In the Timber Brook and adjoining streams there are interesting outcrops of gneiss, syenite, hornblende-schist, felsite and diorite, into which the brook has cut, through the Carboniferous mantle the remains of which still lie on the slopes.

For more than two miles from its source, the Barasois Brook flows among marshes, showing only blocks of coarse diorite; laminated quartzite, diorite and gneiss occur down to a large branch from the eastward, in which, above some large marshes, whitish and grey, fine and coarse quartzite and granite strike. N. 75° E., the quartzite greatly predominating, while most of the brook below this branch is occupied by diorite and syenite, occasionally foliated, blotched with

Intimate mixture of the foliated and non-foliated rocks.

North River Falls.

Irregular distribution of the Pro-Cambrian and Carboniferous rocks.

Barasois River.

St. Ann's camp.

Smith Brook
silver mine.

quartz and containing a large quantity of silvery mica. Greenish granular felsite-slate occurs in a narrow belt about five miles above the settlement, and mica schist is found in a tributary from the westward. In the brook above John Morrison's, syenite alone is found, whereas, in that further south, as well as in the main stream down to the lower bridge, felsite predominates, containing, like all the rocks of this district, much iron pyrites and associated in the McKay branch with diorite. The Smith Brook "silver mine" is in syenite, but above the Tarbet road felsite prevails for some distance, succeeded again by syenite at the source.

Tarbet road.

Metalliferous
veins near
Englishtown.

On this road and on that along the shore, diorite and felsite accompany syenite, and near the base of the Englishtown sand bar, porphyritic felsite forms the hill. On the shore opposite Englishtown a similar porphyry contains metalliferous veins of calcspar and quartz, but it succeeded further south by bright red syenite, also veined by diorite and quartz, which extends to the mouth of the North River.

Silver mine of
North River.

The syenite of Elder Brook has an obscure westerly dip or jointing with which the dykes coincide, but higher up alternations of epidotic porphyry, diorite and other Coxheath rocks contain the "silver mine."* Similar felsites also occur in the brook flowing down the opposite slope of the mountain, whereas, in those further north, syenite prevails. It is a noteworthy fact that the brooks of this mountain are in pairs, with sources only a few feet apart, the water flowing both ways from a marsh or slight depression in the hill-top.

Indian Brook.

At the head of the west branch of Indian Brook, below the barren, blocks of mica schist and quartz are occasionally seen, although for a distance of five miles the brook is sluggish, and shows few exposures. About three miles from the source, syenite and milky quartz occur, and half a mile lower, mica and hornblende schists, which, with quartz-felsite, syenite and granite, extend to McMillan Brook. Among these rocks is a light-grey, finely laminated, somewhat granular quartzite, containing many grains of white and black mica, and passing into mica schist. The layers seldom exceed a few inches in thickness, and are often separated by veins of white and colorless vitreous quartz, sometimes of large size and holding a few specks of hornblende. The mica schist in some places contains talc, and large, prominent grains of quartz. In the McMillan branch, finely foliated mixtures of quartz and mica occur, both near its confluence with the main brook and also among the marshes at its source. Similar rocks are found with syenite and granite as far as a marshy brook from the northwest, in which syenite is succeeded up stream by whitish granular quartz-

McMillan
Brook.

*Report for 1876-77, p. 452.

ite, with a few small specks of black and silvery mica and crystals of quartz and felspar often a quarter of an inch in length; a nearly compact, greenish diorite, in which the grains of felspar and hornblende are distinct, and a quaternary granite with both hornblende and mica scarce. A short distance above the fork are coarse, granular mixtures of felspar, hornblende, quartz and mica, with epidote and quartz in blotches. Large rocky pools abound along the river. The syenite of the cliffs below the fork is cut by diorite dykes and blotches, and prevails also on the road from the upper settlement to the church. Above the shore road, syenite, gneiss and felsite form the wild cliffs, deep pools and foaming rapids which guard the passage to the inaccessible gorge above, and occur also in Eel Brook, the steep, rocky tributary at the foot of this gorge.

In the east branch, granite and gneiss fringe the shore of Gisborne Lake, and, above the confluence of the brook from the lake, coarse syenite and quartziferous mica-schist, are associated with epidotic hornblende rock. Below the confluence the river becomes rapid, the banks higher, and coarse, reddish granite or quartz-felsite is seen at intervals, passing into syenite, diorite and epidotic felsite with quartz veins. About a mile and a half above the fork fine-grained gneiss is met with.

East Branch of
Indian Brook.

The beautiful and precipitous little brooks which dash down the mountain between Indian Brook and Little River expose only syenite, but in this river syenite is accompanied by coarse granite and banded, granular felsite, veined and blotched with calcspar and epidote. At the first fork there is an outcrop of Carboniferous conglomerate, above which, in the wild branch from the west, syenite, containing mica and cut by diorite dykes, is succeeded by felsite. French River, and all the streams north and south of it falls roughly over similar rock, in gorges and beautiful falls, at the foot of one of which is a cave.

Brooks of the
North shore of
St. Ann's Bay.

Carboniferous
outlier.

The conglomerate of the shore is succeeded at McLeod Brook by grey diorite, bluish felsite and coarse, grey syenite. Unlike others of this region, this brook is an easy one to ascend, the banks being low and its valley wide and timbered with hard-wood and a few pines to the small barrens at its source.

Syenite and felsite with veins of pyritous quartz underlie the Carboniferous rocks in the stream between McLeod and Path-end brooks, the former containing large crystals of felspar and a fissure three-quarters of an inch wide filled with hematite. In this brook is an immense landslide, which has filled the narrow gorge with trees and broken blocks of felsite. Path-end Brook shows soft and crumbly chloritic syenite with bands of granite and dykes of bluish diorite containing veins of calcspar with a minute quantity of iron pyrites and red hematite. For a mile above the road cascades abound; then begins a wild,

Traces of iron.

bouldery gorge with high walls of syenite, ending abruptly against a perpendicular fall.

Smoky Cape. The massive cliffs of Smoky Cape are of syenite, which prevails also on the road across the mountain and in the neighboring brooks.

Ingonish River. Course, red and greenish syenite and granite occupy the bed of Ingonish River as far as McKinnon Brook, and extend half a mile up the two brooks flowing into the river from the south, beyond which they are replaced by felsite and gneiss. At the confluence of McKinnon Brook, syenite is associated with a thick-bedded grey, and greenish rock containing hornblende, serpentine, chlorite and strings of white quartz. Blocks of crystalline limestone were also seen, but not in place. In this brook, diorite with small quartz veins, reddish coarse Louisburg breccia and red syenite with chloritic and epidotic streaks are succeeded up stream by bluish-grey gneiss, granite and diorite, and these, again, by syenite.

Limestone. A belt of syenite occupies two miles of the river above McKinnon Brook, followed by two miles and a half of gneiss and crystalline limestone, beyond which syenite continues to the source of the river, but gneiss appears immediately on leaving it, in the brooks on either side.

Contact of Pre-Cambrian and Carboniferous rocks. The distribution of the syenite and overlying gypsum around the ponds at the mouth of Ingonish River is shown on the map. The former is sometimes foliated, and associated with friable granite and very massive, steel-grey, banded diorite.

Garnetiferous granite. Power Brook shows diorite, syenite and bright red, garnetiferous granite. The syenite contains large veins of quartz and is associated higher up with felsite, quartz-felsite, mica-schist and gneiss, with large blocks of crystalline limestone.

Limestone Ingonish. The cliffs on the headland between the north and south bays of Ingonish display syenite, gneiss and felsite, capped in places by conglomerate, sandstone and gypsum. Ingonish Island consists of dark, bluish-grey felsite or diorite, except at the western point, where Carboniferous limestone appears.

Clyburn Brook. The hill north of the mouth of Clyburn Brook is composed of granite and syenite, but the greater part of the brook is occupied by slaty and gneissic rocks. Not far above the settlement are pearly, aluminous slates, felsite, and hornblende schist. In Curtis Brook, near the barrens, syenite is mixed with obscure gneiss containing blotches of quartz. Reddish-grey quartziferous granite and gneiss then alternate in a series of cascades and falls, the granite being apparently interbedded with the gneiss, which is often almost wholly composed of silvery mica. The brook is alternately very smooth and very rough. The cliffs and gorges below the fork contain greenish and bluish feldspathic

slates with large blotches of quartz, generally more or less pearly, and not unlike certain Louisburg rocks, except in the absence of the brecciated structure. At the junction with Clyburn Brook they are extremely coherent, obscurely granular, and largely composed of quartz. Between Curtis Brook and the south branch of Clyburn Brook, light bluish-grey and greenish slate, mica and hornblende schist, syenite, felsite and diorite occur among falls and cascades, pools and gorges, the brook being exceptionally rough throughout. In the north branch, above the fork, foliated rocks occupy more than half a mile, beyond which red, coarse, quartz-veined syenite, with specks of white, black and golden mica, shows obscure bedding in the wild gorges as far as its source near the head of Cheticamp River. The quartziferous slate, gneiss and mica schist, with twisted quartz veins in the bedding, which occur everywhere in the south branch and in the adjoining tributary of Ingonish River, form, near the fork, cliffs and pools and, higher up, flat-topped hills occupied by barrens. Some of the schists consist largely of mica, and the gneisses are irregularly mixed with syenite and felsite, which are often in the form of lenticular streaks or veins.

In the north bay of Ingonish is a patch of red porphyritic granite, in which the felspar largely predominates, occurring in crystals sometimes two inches in length, or in veins two or three inches wide. The quartz is in large, nearly colorless grains, the mica in small, black, scattered crystals, and hornblende also sparingly present. The felspar veins contain small particles and streaks of quartz, and resemble the reddish quartz-felsite of Benacadie* and other places, which is supposed to be of igneous origin. Light-grey, nearly compact porphyritic felsite also occurs in a mass or in small spots in the granite.

Cameron Brook, as far as it was followed, shows a similar epidotic granite, but in Dundas Brook the massive syenite immediately underlying the Carboniferous rocks is succeeded by gneiss, greenish hornblende schist and dark slates blackened with graphite and spotted with calespar. The slates are associated with irregular masses of grey, gneissic rock, and with greenish and reddish, finely laminated felsite, very like that of Capelin Cove* and Gabarus. Quartz in blotches and lenticular veins abounds in the bedding planes of the felsite, which contains also patches of red syenite. For about a mile above the first lake, reddish and grey syenite and granite occur, but above this point gneissic rocks again prevail.

For the first mile above the junction of the Carboniferous and Precambrian rocks, Warren Brook shows red syenite, greenish and grey

*Report for 1876-77, p. 408.

*Report for 1877-78, p. 9 F.

- diorite and obscurely foliated, chloritic and hematitic, mixed rocks. Above the fall is a belt about equally wide of foliated rocks, some of which are for the most part composed of mica and others of milky quartz. Higher still, red syenite and granite form very rough cascades, but on the dry, broken, hummocky barrens east of the Lake of Islands, a gneissic mixture of quartz and mica is seen, while on the lake shore is a coarse, porphyritic granite, full of minute garnets.
- Garnetiferous granite.** South of the mouth of Warren Brook an outlier of syenite and felsite forms the rocky promontory of Red Head. A short distance north a rocky shore of granite and syenite succeeds the Carboniferous strata on the bench and extends past Green Cove and Neil's Harbor; and similar rocks occupy the road from Ingonish to Halfway House, and thence to Aspy Bay. Many of these are essentially quartz-felsite, some portions of which contain black mica, while others consist principally of mica and flesh-red felspar. Red syenite predominates in Mary Ann's Brook and in the branch of Warren Brook south of it, occasionally displaying foliation. In Neil's and Halfway Brooks, red coarse syenite and granite with large blotches of mica appear, and on a barren at the head of the latter is the "mica mine."
- Red Head.**
- Ingonish to Aspy Bay.**
- Mica Mine.**
- Black Brook.** The more or less foliated syenite and granite of Black Brook, between Sunday Lake and Snipe Brook, are not well exposed, the brook being sluggish, but similar rocks in Snipe Brook contain much silvery mica. Three-quarters of a mile lower, another feeder enters from the south. In the main brook, between the two, are cascades over ledges of fine and coarse granite and syenite, often containing only a small percentage of hornblende and mica, sometimes foliated and intersected by seams of white and flesh-red quartz in all directions, but more especially in the planes of bedding, and containing pockets of flesh-red felspar. Coarse, red, porphyritic syenite with flakes of silvery mica appears in the feeder, below which and in the small brook from the north it is associated with chloritic, hornblende and hematitic rocks, and contorted dark, and light-grey mica schist, cut by dykes of diorite and syenite. Lower down belts of intervalve line the sides, and the brook is easily followed. In the branch called Doherty Brook, syenite in thick beds is variegated with large blotches of milky quartz and flesh-red felspar. At the falls, a dark, contorted gneiss contains silvery and golden mica, and quartz veins holding mica and black metallic specks. In the dark gorge between Doherty and Donovan brooks, and below the latter, coarse, quaternary granite is mixed with grey syenitic gneiss and mica schist, often contorted, with bands, blotches and veins of quartz, some of the laminated rocks containing crystals of andalusite or hornblende in the form of a star. Still wilder gorges occur below Pine Brook, the perpendicular walls of

red syenite being cut in places by dykes of diorite and grey vesicular trachyte.

Porphyritic syenite and granite occupy the iron-bound coast between Neil's Harbor and White Point, and extend from South Harbor to the road between Glasgow Brook and South Aspy River, but at French Cove, north of New Haven, and at a few other points, they are accompanied by fine gneiss. In Glasgow Brook and that south of it, and in the South and Middle Aspy Rivers, light-grey, black and reddish, fine and coarse gneiss prevails, containing a variable proportion of mica and hornblende.

Succeeding the red and grey conglomerate, grit, sandstone and marble of the Little Southwest Brook are the banded rocks with blotches of quartzose limestone already described in the neighboring brooks. The hill on the north side of the magnificent glen of the North River consists, for the most part, of massive syenite, granite, diorite, felsite and quartz-felsite, often chloritic and hematitic, like the rocks seen in Blair River, Gray's Brook and the streams to the eastward.

For a considerable distance above the top of the glen, the river bed is wide, sometimes rough, but never very steep, descending over a succession of small rapids and exposing dark bluish-grey and mottled red and green hematitic, serpentinous, pyritous and calcareous, friable, glistening, laminated, contorted felsites and quartz-felsites, which resemble some of the River Denys strata, like which they also include bands of limestone, one of them a foot and a half thick, dividing into strings among the other rocks. In the Big Southwest branch, laminated, chloritic felsite, quartz-felsite, mica-schist and syenitic gneiss form an exceedingly rough brook, rocky and full of gorges from end to end, the water being also dark-brown, unlike that of the main river, which is clear and from springs. Above the Big Southwest, laminated, contorted felsites and quartz-felsites are met with.

In Wilkie Brook above the road, is a grey, compact, splintery, micaceous felsite, passing into syenite. The Zwicker branch flows over compact quartz-felsite containing veins of quartz, succeeded higher up by bluish and reddish-grey mica-schist and gneissic rocks with white quartz veins, one of which is five feet thick. Beautiful micaceous rocks follow, with red and grey granite, including an outcrop of pyritous, crystalline limestone, which is, perhaps, a vein and is again followed by red granite and gneiss, the whole series resembling that of Middle River hereafter to be described. Above the Carboniferous rocks in the main branch near the shore, granite and hornblende-rock occur, the granite containing quartz veins surrounded by chloritic and hornblende rock. The greater part of the wide valley of the brook is, however, occupied by grey, micaceous sandstone, like that of

Coast between
Aspy Bay and
Neil's Harbor.

North Aspy
Glen.

Crystalline
limestone.

Wilkie Brook.

Limestone.

Traces of iron
and copper
ores.

Bay St. Lawrence, underlaid by syenite and diorite, the former being cut by quartz veins, the latter full of streaks of red hematite and calc-spar; and at the head of the brook, which rises in a small, scruggly spruce barren, mica-schist and gneiss appear, although red syenite and granite form the precipitous slopes of the hill behind the church. In many of the rocks and veins of this neighborhood traces of copper ore have been discovered.

Cape North.

The road between Aspy Bay at Wilkie's and Bay St. Lawrence follows a very pretty valley, traversing a pass from which the sea, the Sugar Loaf and the mountains of Cape North are in sight. Syenite, purple felsite, micaceous and hornblendic felsite and contorted, friable, aluminous slates, like those again seen in the brook at Bay St. Lawrence, cross this road, red granite being on the backlands road halfway between the two shores.

North of Wilkie's, red syenite forms the steep and rocky eastern shore to Cape North. The track from Bay St. Lawrence to Money Point shows syenite, diorite, gneiss, quartz-felsite and felsite, and these rocks are also seen in Salmon River, in the Black Point, Wreck Cove, Meat Cove and Lowlands brooks. The felsite is for the most part bluish-grey, but also purplish, sometimes granular, contains quartz, and is associated with crystalline limestone and serpentine in Meat Cove Brook and near Cape North.

Limestone and
serpentine.

Coast from the
Lowlands to
Pleasant Bay.

The coast from the Lowlands to Poulet Cove was not examined. It is high, precipitous, and probably all occupied by these rocks. In Otter Brook, bluish-grey felsite and syenite underlie Carboniferous sandstone and conglomerate. Among the gorges and cascades of the Red River, obscurely bedded quartz-felsite and quaternary syenite contain a little hematite and veins of quartz. At one point the rock is distinctly laminated, has blotches of crystalline and semi-crystalline limestone, and is in part made up of limestone, quartz and felspar, all white in color.

Limestone.

Pleasant Bay.

In the little brooks on the south side of the glen of Grand Anse River, syenite predominates, but granite also occurs. At the head of the settlement it is foliated and associated with gneiss and banded felsite. On the steep ascent of the road and nearly all the way across the mountain, banded felsites are met with; at the foot of the mountain, in the river above Norman McIntosh's, these are associated with coarse quartz-felsite and syenite, blotched with white quartz and limestone, and broken through by dark diorite. Similar rocks continue to the source, and are again seen in McIntosh Brook, in which, also, streaks, blotches and masses of crystalline limestone several feet in width occur among syenite and gneiss.

Limestone.

Mackenzie
River.

At the head of Mackerzie River, grey granite, granular quartz-fel-

site, syenite and light and dark-grey, pearly, micaceous, contorted syenitic gneiss are cut by quartz veins running parallel with the bedding, some of which are vesicular from the decomposition of iron pyrites. Some of the cascades lower down are over indian-red coarse quartz-felsite, colored with hematite, with here and there specks of mica. Large, intrusive masses of bluish and greenish diorite, sometimes porphyritic, with numerous large and small crystals of felspar, occur among the quartz-felsite and syenite of the lower part of the river, which is very rough and shut in by high hills; and among the coarsest rocks gneiss appears at intervals. At the mouth of the river, imperfect gneiss is veined with calespar containing bright green and purple patches of fluorspar and specks of galena. South of the last house on Pleasant Bay and at a boat landing on the shore, fine gneisses with a steep northwesterly dip are cut, along and across the bedding, by large veins and masses of bright-red coarse syenite, quartz-felsite and compact felsite. There is often no distinct line of separation between the syenite and gneiss, but rather a passage of one into the other.

Diorite dykes.

Fluorspar and galena.

Syenite veins.

Fishing Cove River.

Garnetiferous rocks.

Fishing Cove River crosses bluish felsite, reddish quartz-felsite and other similar rocks, bands of syenite, granite and diorite blotched with quartz, and micaceous and hornblendic gneiss. In the main branch above the fork these rocks are generally foliated, but sometimes very coarse. North of the Cove the granite, gneiss and syenite are garnetiferous. The syenite on the hill near the Cove, perhaps underlies the Louisburg shales seen further south, which occupy the road from the copper mine to the Presqu'isle Beach and for a considerable distance north. They are bluish-grey and indian red, mottled, fine, pearly, foliated, sometimes fibrous, splashed, or seamed with quartz or calespar. In places they have a bird's-eye appearance, being covered with small, hard spots, for the most part garnets. On the steep road up Cape Rouge Mountain, mixed gneisses prevail and form a bold hill with deep gulches, on the top of which the aluminous shales again appear associated with a laminated quartz-hornblende rock containing crystals of hornblende a quarter of an inch long. Jumping, Corney, Trout and other brooks of the vicinity expose micaceous talcose and hornblendic schists, diorite and syenite, often traversed by quartz and calespar veins, and overlaid by the light-brown sandstone and red marl of the Carboniferous belt that skirts the shore.

Cheticamp copper mine.

Cheticamp River.

Jerome Brook comes to the sea in a deep valley showing a narrow belt of conglomerate and sandstone, succeeded almost immediately by Louisburg felsites, which, a short distance up stream, give place to the syenite which occupies the head of the brook. Immediately north

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of Jerome Brook are quartz-veined syenite, dark, laminated rock, compact red felsite, and a diorite in which copper pyrites has been mined.

On a review of all the facts relating to these rocks it is difficult to come to any satisfactory conclusion concerning the relation of the stratified ~~or~~ foliated to the massive portions, nor does it seem possible to separate the two.

Roughness of
the river and
its branches.

Cheticamp River, the upper part of which is strikingly beautiful, for three miles above its mouth flows in a valley occupied by Carboniferous rocks. The Robert branch, for more than a mile from its confluence with the river, cuts through compact, massive felsite and amygdaloidal trap mixed with syenite, above which red syenite and quartz-felsite extend three or four miles further to the gneiss and mica-schist of the head of the brook. The Faribault branch near the lakes and marshes at its source passes over pearly hornblende schists and other laminated rocks, associated lower down with coarse quartz-felsite, syenite, very micaceous gneiss and whitish coarse granite, the whole series resembling the auriferous rocks of Middle River. The schists occasionally contain talc, mica and gash veins of quartz, generally in the bedding but also crossing it. Below the little feeder, two miles and a half up, the brook is very wild and descends rapidly; in the lower part are falls, gorges and caves cut out of the pearly schists. In the next branch—an easy brook to follow, with the exception of some high falls at the upper fork—hornblende schists and slates dip S. 70° W. < 45°. For about two miles higher the river is comparatively smooth and mica and hornblende schists prevail, but above this point for nine miles is a deep and dangerous, almost impassable ravine, with high falls and pools, occupied by syenite, granite and diorite, often gneissic, and cut by quartz veins. At Fern Brook, reddish syenite and granite are in the river, while in the tributary they are accompanied by mica-schist and gneiss; and in the gorges, higher up strike vertically north-west, in thick beds, associated, with beautifully banded rocks, blotched with quartz, felspar, chlorite, mica and hornblende in patches. Half a mile from the river Artemise Brook flows sluggishly not far below the level of the adjoining country, exposing quartz-felsite with a small percentage of mica and hornblende and generally banded. For about a mile and a-half above Artemise Brook the river continues to rush wildly through gorges, then for the rest of its course through marshes. Grey and red micaceous syenite and gneiss, cut by quartz veins, some of which hold traces of galena, continue as far as any rocks are seen, but for the first four miles among the barrens and marshes none are exposed. The grey syenite is, as a rule, more distinctly banded and finer in texture than the red.

Traces of lead
ore.

Au Coin Brook, which empties near the mouth of Cheticamp River,

passen over bluish and purplish felsite, diorite and syenite, veined with calespar. Greenish and reddish syenite and diorite come in between the outliers of Carboniferous sandstone and trap and occupy most of Fisset Brook, but near the head of the south branch bluish-grey and greenish quartz-veined slates show a very variable dip.

At the beautiful fall in the Farm Brook, reddish felsite and quartz-felsite succeed the sandstone, while higher up dark diorites, full of calespar and curiously spotted green and red, occur in patches with red syenite, intersected by irregular quartz veins. Another outlier of trap and altered grit similar to those of Fisset Brook occurs near the head of Farm Brook, and in the same neighbourhood pearly felsitic shales or schists contain masses of milky quartz. In the first branch above the settlement coarse light-brown felsite and quartz-felsite occur; and in another branch higher up, quartz-felsite with diorite dykes and quartz veins is succeeded by sandstone and shale and these again by banded felsite.

In the Factory Brook another small outlier of Carboniferous rock lies far up among the red and grey coarse syenite and granular quartz-felsite which occupy the remainder of this brook as well as those of Grand Etang, where they contain traces of hematite and calespar.

Galant River Area.—South of the Pre-Cambrian rocks just described, and separated from them by the narrow Carboniferous belt forming the Forest Glen, is a large Pre-Cambrian area bounded on the east by the Carboniferous rocks of Northeast Margaree and on the west by those of the shore; and cut by branches of the Galant and Northeast Margaree Rivers. In the lower branches of the former, reddish felsite and syenite occur with diorite. In Mink Brook and that north of it, bluish and greenish epidotic and hematitic diorite associated with mica schist, compact felsite and quartz-felsite underlie quartz-veined grits and sandstones. In the main river to northward are outcrops of dark bluish-grey thick-bedded felsite, compact and coherent, sometimes chloritic; a flesh-red mixture of quartz and felspar, the latter predominating; and a mixture of quartz in somewhat large granules with specks of golden and silvery mica. The river, which is easy to ascend throughout its entire length, is here rocky and rises rapidly.

The hills near the fork on the Marsh-brook road are not well defined, and many of the rocks are probably Carboniferous traps rather than Pre-Cambrian felsites, the grits and associated rocks of the neighbourhood being also greatly altered. A bluish-grey granular diorite containing specks of iron pyrites is found on the hill west of the road.

At the head of Coady Brook is a quartz-felsite passing into syenite, followed lower down by greenish-grey or blackish amygdaloid with

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Carboniferous
traps cutting
Pre-Cambrian
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amygdules of calc-spar, quartz and a blackish chloritic mineral. Lower still are bluish-grey flinty felsite and dark-grey fine trap with cliffs of purplish, compact, porphyritic, Coxheath felsite and breccia.

Above the road in the next small brook, grey granular syenite with threads of quartz is associated with diorite and a curious quartz:felsite in which the felspar and quartz are nearly separate, the felspar being in large grains and blotches through which the quartz runs in irregular streaks or in veins an inch thick and downward. This rock passes into an ordinary quartz-felsite or syenite; in color it is reddish or whitish according as the felspar or quartz predominates. The upper part of the brook is rough and steep, reddish-grey coarse syenite and dark-green fine diorite being well exposed in great cliffs.

McLean Brook displays reddish and greenish-grey syenite, but no limestone of McLean Brook. laminated rocks, although blocks of whitish and grey crystalline limestone occur not far above the road.

Blackrook.

Between McLean and Ward Brooks the hills close in to form the beautiful gorge through which the river here runs, and at Blackrook come so close to the river that the road has to be embanked, dark-greenish, calcareous, epidotic, often slaty diorite accompanying felsite and syenite.

Big Intervale

Ward Brook and the steep hill west of Big Intervale display peaks and crags of dark-grey epidotic rock, chiefly felsite full of white quartz. On the mountains behind the post office, a more coherent quartzose felsite is found and to the westward a large exposure of milky quartz. The top is tolerably level, clothed with hardwood and about 950 feet above the river, while further back the land rises to a still greater height. Behind the schoolhouse, reddish, granular, porphyritic, Coxheath felsite occurs.

Copper ore and limestone of Stewart Brook.

In the rough valley of Stewart Brook greenish-grey quartzite, bluish felsite and micaceous, pyritous diorite are succeeded by hornblende- and mica-schist in which occur small specks of copper pyrites and veins or beds of crystalline limestone, followed at the head of the brook by diorite, quartzite, quartz-felsite and coarse granite.

Forest Glen.

Peter Stewart Brook, which flows from large hay-marshes into Forest Glen two miles above the river, exposes reddish felsite. On the road through the glen coherent sandstone and grit are generally in place, associated near Pembroke's with dark trap, and in Pembroke Glen with trap and felsite of various kinds.

Felsites of the Margaree Sugarloaf.—East of the Galant River area is that of the Margaree Sugarloaf, also surrounded by Carboniferous rocks. At the northern end this mountain, which is three miles in length and 900 feet above the river, is composed of flesh-red, fine and coarse syenite,

diorite and thick-bedded quartz-felsite containing specks of hornblende and mica. In the small brook which comes to the road at the school-house near Widow Peter Ross' are grey and white granite, red syenite, mica and hornblende schists with milky quartz. At the south end compact and amygdaloidal felsites come near the road whilst higher up syenite and quartz-felsite appear with occasionally dark epidotic diorite.

Northern Felsite Area.—Resuming the description of the main Pre-Cambrian area we find in the Turner Brook of Forest Glen reddish or grey, compact, vesicular and porphyritic, epidotic and hematitic felsite, succeeded by chloritic, calcareous and talcose aluminous slates, and fine mica schists with patches and veins of quartz. The schists are sometimes hollowed out into caves twenty feet deep and six feet wide, the largest of which occurs at the foot of one of the high and beautiful falls which this brook makes below the large marshes.

McInnes Glen Brook above the settlement exposes red syenite, diorite and felsite, not unlike some of the Coxheath rocks, veined with epidote and stained with hematite and calcite in the joints. They are of various colors, obscurely laminated, often flinty, with pearly surfaces and contain threads and masses of quartz.

The bed of the Northeast Margaree River for some distance above John Murray's, and the bare red hills, on the top of one of which is Cape Clear barren, are occupied by red, very coarse quartz-felsite and syenite, some of the crystals of felspar being more than an inch in length, the grains of quartz smaller, those of hornblende very small and scarce, while some interesting varieties contain a large proportion of quartz. Most of these rocks are devoid of lamination, but some parts plainly exhibit a banded, foliated or bedded structure. From a wild defile, overhung by red syenite the First Fork Brook flows into the river, and for nearly four miles up no other rocks appear except an occasional outcrop of diorite or felsite. At the head of all the branches, however, schists and gneisses are met with.

In the Second Fork Brook the coarse syenite also contains mica and is sometimes furrowed by the disintegration of softer parts which run in thin bands, giving the perpendicular walls of the gorges the appearance of huge courses of masonry. Dykes of dark-green diorite and veins of quartz occasionally cut the syenite which is succeeded about a mile from the source by talcose and micaceous schists, the mica being white, golden or dark-brown. Near the fork is a block of crystalline limestone.

The immense mural cliffs in the river above the second fork display a micaceous syenite, coarse and reddish, with large white imbedded spots of quartz, often mixed with patches of compact felsite with por-

- Salmon pools.** phytically imbedded crystals of felspar. The valley is wide; long wild grass grows along the banks, while at intervals occur the salmon pools which have made this beautiful river so celebrated. Higher still are cliffs of mottled Coxheath felsites like those described before, mixed with and passing into quartz-felsite and syenite and also into rocks resembling the auriferous slates of Middle River. These rocks have an obscure northerly strike, but occupy a comparatively narrow belt among the prevailing syenite.
- Rocky Brook.** Red syenite occurs for some distance up the Rocky Brook with reddish and purple, fine, soft amygdaloid, having a few grains of quartz scattered through it and often hematitic and chloritic like the rocks of Cape Rhumore. At the first little tributary of the east branch the rocks resemble those of Gabarus and Coxheath. In the little brook, compact, purplish, reddish and dark, mottled traps and flinty felsites dip about N. 70° W. < 25° and lower. Shaly felsite of various colors follows, becoming grey, compact and papery near the top of the brook where a block of milky crystalline limestone or calcite was also found. Above this feeder the Rocky Brook dashes down a declivity into a wild gorge, with perpendicular walls of greenish shaly felsite, above which it flows for two miles in a sluggish course showing only a few outcrops of felsite.
- Limestone.**
- Quartz veins.** In the west branch of Rocky Brook, laminated Coxheath felsites, containing a small quantity of hornblende, and soft, pearly schists with traces of hematite are covered with a network of quartz veins some of which are a foot or more in thickness.
- Iron ore, Coinneach Brook.** Syenite still holds in the river above Rocky Brook and contains a few specks of magnetic iron ore. For some distance up Coinneach Brook it is coarse, has very little hornblende, a few specks of silvery white mica, and passes into salmon-colored, compact, porphyritic felsite. The brook is very picturesque, dashing and foaming in little cascades over bright-red syenite. Higher up, where the syenite comes in contact with contorted mica-schist, the latter is seen to underlie the syenite with a northwesterly dip and to pass into a dark-grey compact felsite traversed by veins of milky quartz and fine-grained, flesh-red syenite, which is again replaced upstream by mica schist, a band of which, five feet thick, is, as it were, intruded among the syenite. A quartz vein runs between the schist and syenite on the northeast side, but becomes in places mixed up with or passes into the schist. At the head of the brook all the rocks are gneiss, mica-schist and the like.
- Contact of syenite and mica schist.**
- Calumruadh Brook.** For more than two miles up each of the branches of Calumruadh Brook the coarse syenite of the river prevails, followed in the south branch by bluish-grey fine gneiss and mica-schist traversed by minute veins of red syenite and felsite and associated with hornblende schist,

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compact reddish-grey and mottled felsite and quartz-felsite with an approach to granular structure. A very quartzose granite is found near the head of this branch and in the barren to the northward, together with finely foliated gneiss and mica-schist. In the north branch, red granular quartz-felsite, compact, mottled, epidotic felsite and fine, chloritic, talcose and quartzose mica-schist are in some places so blotched with quartz as to constitute quartzites. Quartzites.

The high cliffs above the Three Brooks are composed of syenite and granite which often pass into nearly pure felsite. In the Marshpool Brook occur flesh-red felsite, dark, laminated, argillaceous rocks, and pearly shales or slates.

Jim Campbell Brook exposes red and grey syenite, granite and gneiss, diorite and laminated pearly felsite, containing large blotches or veins of greenish and whitish epidote. The syenite is seen to pass into hornblende-schist, felsite and granite. On the shore of the lake is a red, flinty, compact felsite. At the mouth of the brook the following rocks in descending sequence dip S. 70° E. < 70°. Jim Campbell's Lake.

	FEET.	INCHES.
1. Dark greenish-grey, laminated, fine syenite with the constituents well mixed.....	4	0
2. Glittering, quartzose mica-schist.....	0	2
3. Dark grey syenite and granite with blotches of quartz and flesh-red felspar.....	5	0
4. A rock composed of quartz and felspar in thin seams which run along the strike with hornblende and mica..	3	0
5. Greenish-grey compact syenite, with large irregular bands of coarse granite containing hornblende.....	12	0
6. Coarse granite; the constituents in irregular blocks and blotches; hornblende present.....	3	0
7. Similar to No. 6, but rougher.....	12	0
Total thickness.....	39	2

Gneissic rocks in great variety and similar to the foregoing, including unstratified patches, occur in both the North and East branches above the Two Brooks. In the East branch both coarse and fine syenites are frequently banded, and in a tributary from the north, three miles above the fork, hornblende-schist and foliated syenite accompany felsite, syenite, granite and diorite. Head of N. E. Margaree River.

Returning to the settlement we find reddish syenite prevailing in Peter Ross, Ranald and other small brooks of the vicinity, although in some cases it is obscurely laminated and contains thin veins of quartz and calespar; whereas banded felsite, mica-schist, diorite and other rocks accompany the syenite of Charlie's Brook.

The first Pre-Cambrian rock seen in the Nile above the settlement is N. E. Egypt.

a syenite mixed with dark-grey and reddish syenitic gneiss and followed by gneiss and hornblende-schist, dark-grey glistening mica-schist and reddish granular quartz-felsite with large blotches of quartz and films of red hematite. Schistose rocks are everywhere present in this brook.

Lake Law.

The very irregular boundary of the Pre-Cambrian rocks south of North East Egypt has not been traced in as great detail as could be desired. Coarse grey granite and mica-schist were seen in Ryan Brook and the vicinity, and granite, diorite, grey banded quartzite gneiss and mica-schist, in the brook at the foot of Lakes Law.

Behind Lake Law post office a brook shows cliffs of greenish and bluish-grey contorted rock, chiefly laminated quartz-felsite and felsite holding plates and blotches of milky quartz in the bedding and succeeded up stream by schistose rocks like those of the Gold Brooks. In Fortune Brook mica- and hornblende-schist, felsite, gneiss and coarse granite are abundant.

Middle River.

In Middle River, above Kenneth McLennan's, the first Pre-Cambrian rocks met with are fine bluish-grey and whitish mica-schist and gneiss with irregular lenticular veins of pyritous, white, vitreous quartz, a foot thick and under, in the bedding. Above the bright red soil of the settlement, in the First Gold Brook—that from which probably most gold was obtained—come greenish, soft, pearly, micaceous shales and slates, often chloritic and containing masses of quartz. They are essentially felspathic, but have a good deal of very fine mica in the bedding planes and do not cohere very strongly but separate easily, often along lines of oblique cleavage or jointing which break them into pieces of smooth irregular shape. They are followed by ordinary Coxheath felsites.

First Gold Brook.

In a brook from the north, half-a-mile above the First Gold Brook, gneiss, mica-schist, granite, syenite and quartzite occur. Between the mouth of this brook and the Second Gold Brook the following rocks are met with :

1. Dark hornblende-rock associated with flinty, nearly compact gneiss.
2. Decomposed diorite or hornblende-rock in cliffs.
3. Bluish-grey pearly mica-schists, blotched with quartz and dipping N. 35° W. < 45.
4. Dark-green hornblende schist overlaid by light-grey pearly mica-schist and by obscurely granular, twisted gneiss, containing a quartz vein at least one foot thick.

Section in the Second Gold Brook.

In the Second Gold Brook the following rocks are found, the dip being uniform, and the aggregate thickness about 5,500 feet :

1. Light-grey and bluish-grey, fine, pearly, micaceous, felsitic shales, sometimes contorted, thickly covered with rusty spots. The mica is finely divided and sometimes predominates.

2. Schistose diorite and greenish or black hornblende-schist with porphyritic crystals of hornblende.
 3. Bluish-grey and greenish obscurely granular, quartz-mica rock, with a light tinge of pink, passing into fine gneiss. A large quantity of calcite is present in the joints, and also as one of the constituents. Calc-schist.
 4. Bright-green, chloritic and talcose, pearly schist.
 5. Compact and obscurely porphyritic felsite,
 6. Bluish-grey felspathic schists, containing both mica and hornblende, and breaking into rhomboidal blocks.
- All the rocks contain white vitreous quartz full of cavities filled with iron ochre, part of which at least seems to result from the decomposition of a ferruginous carbonate. Calcite also exists in some of the veins, and the quartz is not unlike some of the gold bearing quartz of the Nova Scotia gold districts. Quartz, carbonate of iron and calc spar.
7. Pearly, felspathic shales with long, dark crystals of actinolite.
 8. Light bluish-grey, argillaceous slates containing much finely divided mica; quartz veins in the bedding, one of which, 2 feet thick, has an obscurely laminated structure. Actinolite schists.
 9. Grey, flinty slates, perhaps a more altered form of 8.*
 10. Bright red syenite, without much hornblende, not included in the above estimate of the thickness and occurring at the head of the brook.

In the river, between the Second and Third Gold Brooks, dark green fine, pyritous diorite, hornblende-schist and flinty, nearly compact, bluish-grey quartzite, containing in places much black mica, are associated with light-grey, finely laminated, granular quartz-felsite.

The hornblende-schists of the Third Gold Brook contain long, porphyritic crystals of hornblende which give the rock a finely spotted appearance, and some of the gneisses are full of garnets, but at the head of this brook also, syenite succeeds the foliated rocks. Third Gold Brook Garnetiferous gneiss.

At the head of the Fourth Gold Brook syenite is again present, followed downstream by fine mica-schist, schistose diorite and gneiss with quartz veins, and a nearly pure hornblende rock containing masses of milky quartz. Soft, light and bluish-grey argillaceous, micaceous rock is found still nearer the river. Gold is said to have been found in all these brooks. At the mouth of the Fourth Gold Brook is a coarse whitish, crystalline granite, with mica in plates three inches long and an inch thick, and the quartz and felspar in still larger masses. With this is associated a dark, beautifully foliated hornblende, schist or pure hornblende rock, in which the hornblende is sometimes coarsely granular and in radiating bunches, and finely laminated, light-grey gneissic rock with a northerly dip. It will be noticed that the hornblende-schists are sometimes composed almost wholly of hornblende. Fourth Gold Brook.

* These are the strata referred to in the Report for 1876-77, page 453. In this report the Garry was erroneously described as, "on the hills at the source of McLean Brook," instead of *at the foot of the hills between McLean and McLeod Brooks.* Porphyritic granite of Middle River.

as the mica-schist of mica, and in the granite the quartz may prevail to the exclusion of the other constituents, in which case masses of quartzite stand alone. The changes are well seen in the small brook half-a-mile above the Fourth Gold Brook.

In the river above as far as Duncan Brook talc, hornblende and mica-schists and quartzite form rapids. On the weathered surface there are scattered minute, red crystals of garnet, showing faces of both the rhombic and pentagonal dodecahedron. Some of the hornblende-schists pass into coarse, reddish syenite and contain emerald green spots of quartz and dark brown specks of crystalline zinc blende. Coarse, rough jointed, broken granite and a dark trappian and dioritic rock, specked with quartz, felspar and iron pyrites, somewhat vesicular and traversed by a one foot vein of quartz break through laminated talcose mica-schist and coarse granite.

Rocks of
Duncan Brook.

The following rocks are met with in ascending Duncan Brook:

1. Quartz-veined, contorted, talcose and glistening mica-schists, passing into granite or an intimate mixture of quartz and mica.
 2. Grey syenite and granite.
 3. Laminated micaceous quartzite.
 4. Coarse granite.
 5. Grey quartz-felsite with specks of semi-crystalline quartz.
 6. An intimate mixture of quartz and felspar, with occasional blotches of brown and white mica Falls.
 7. Banded, fine, grey micaceous syenite, with seams of quartz and hornblende traversing it in an irregular manner.
 8. Quartzose mica-schist breaking into long thin slabs fit for hones, fine in texture.
 9. Fine, grey, micaceous, hornblende quartzite, passing into a coarse mixture of quartz and mica with a small percentage of felspar.
 10. Banded and laminated quartz, mica and hornblende-rocks with some bands entirely composed of one of these minerals.
 11. Syenitic gneiss.
 12. Bluish-grey, crumbly, quartz-felsite, with epidote, mica and seams of quartz which, however, show no metals.
 13. Red felspathic rock in thick beds, blotched with quartz.
 14. Mica and hornblende schists, passing into granite and fine syenite.
 15. Coarse semi-crystalline quartzite, broken, dark-brown, containing small specks and blotches of mica and a little felspar; in contact with quartzose mica schist containing a large quantity of golden mica.
15. Coarse mica-schist and quartzite.

Very micaceous rocks.

In the river above Duncan Brook, coarse, reddish granite with large blotches of flesh-colored felspar, white quartz and mica shows obscure lines of bedding and is followed by syenite, mica-schist and a rock consisting almost entirely of glittering plates of mica arranged in layers. This passes into fine quartzite and hornblende-schist. These rocks con-

Garnets.

tain garnets as large as peas. The prevailing rock in the river and small brooks from the west is a granite of variable composition.

In Bothan Brook this coarse garnetiferous granite is first seen near ^{Bothan Brook.} the river, and prevails for nearly half-a-mile, forming rough falls, gorges and bald cliffs. It is then associated with schistose rocks usually of a grey color, some of which owing, it is supposed, to their structure, appear as if ripple-marked. When the garnets occur on a quartzose surface, they weather out, leaving small depressions.

About a mile-and-a-quarter from the river the granite is succeeded by dark-grey and rusty, jointed, thick-bedded felsite containing a small quantity of mica, and the brook becomes less ragged. Near its source is a very coherent felsite with hornblende in large crystals, and presenting on the weathered surface the appearance of a large ^{Weathered rocks similar to fossils.} chain coral, ribbed and furrowed in all directions.

The rocks of Savach Brook and the vicinity will be described in ^{Savach Brook.} connection with the George River limestone, to which they for the most part belong. Above the limestone, for a distance of more than two miles, coarse, red granite, quartzite, mica and hornblende-schists, all garnetiferous, veined with quartz and resembling the rocks in the vicinity of the crystalline limestones of Whyecomaugh, alternate in the river. Higher still, granite and syenite prevail and the river is sluggish.

Beneath the red Carboniferous conglomerate and grit in McLean ^{McLean Brook.} Brook, south of the First Gold Brook, lies a bright indian-red, coarse, friable granite, containing both mica and talc; the color being due in both cases to red hematite, spots of which are abundant. Higher up, rusty or cream colored, compact, splintery felsite and quartz-felsite are associated with beautiful, bright-colored felspathic and micaceous slates and other rocks of the gold brooks, including quartz veins. Above the fork, in the south branch, greenish-grey, flinty, fine, obscurely bedded diorite is succeeded by compact, splintery felsite and quartz-felsite in bands of different colors, and by greenish soft shales containing calcite and hematite. These striped rocks resemble those of Capelin Cove, but have no granular structure. A bluish-grey fine diorite passes into porphyry in which the base is diorite and the crystals whitish or light-grey feldspar. At the head of the north branch coarse syenite and quartz-felsite are exposed, while lower down are cliffs of pyritous diorite, banded felsite and micaceous shales or schists ^{Auriferous (?) quartz veins.} with lenticular veins of quartz, one of which, two or three feet thick, has been mined for gold.

In the Garry Brook, red syenite, quartz-felsite, felsite, and gneiss occur; and in the adjoining brook at Norman McLeod's, slate, gneiss

and dark-greenish granular diorite. Some of the rocks of this district have been already referred to in the Report for 1876-77, page 453.

Leonard Mc-
Leod's Brook.

McLeod Brook, above the settlement, displays outcrops of grey compact quartz-felsite, fine and coarse, greenish diorite with films of hematite in the joints which are slickensided, syenite and epidotic, chloritic rocks containing quartz and passing into quartzite. In Gillis Brook the abundance of epidote is remarkable, this mineral sometimes constituting half the rock, while the soapy, calcareous, aluminous shales, Louisburg breccia, flinty quartzite, porphyritic felsite and quartz-felsite are very ferruginous, and a coarse syenite shows many grains of hematite. In a little brook a quarter of a mile higher, diorite occurs with light bluish-grey argillo-felspathic shales and slates; and above this tributary, reddish, compact and obscurely granular felsite with a few grains of hornblende is succeeded by cliffs of red quartz-felsite or syenite.

Quartz veins.

Fireclay.

Quartz sand.

Higher in the main brook and in the Muskrat branch similar shales are associated with others more like the rocks of Capelin Cove, flinty and blotched with quartz, as well as in a small brook from the eastward, one mile and a-half above Muskrat Brook, in which also masses of milky quartz, two feet thick and downward, run irregularly in the bedding of pearly micaceous and felspathic shales and a decomposed felsite like the fire-clay of Coxheath, but seem to carry only iron pyrites, chlorite, mica and occasionally hematite. On top of the hill at the head of the brook, the sand is very full of quartz; and if the gold of Middle River comes from these shales it may be also expected to occur here.

Micaceous, hornblendic and chloritic schists, felsite, quartz-felsite, diorite and syenite extend as far as the fork near the head of McLeod Brook. In the eastern branch above this fork, diorite, felsite and syenite are exposed at intervals. At the source, and likewise in the west branch, quartz is again abundant in the sand.

McDonald
Brook.

In McDonald Brook, south of McLeod Brook, laminated rocks are well exposed, consisting of purple, grey, greenish and other colored, compact or granular, porphyritic or vesicular felsites and felspathic shales, spotted with epidote, calcspar and hematite, hematitic quartzites and syenite. On the Crowdis Mountain road, diorite, greenish syenite and felsite contain spots of hematite.

Great Bras
d'Or.

Great Bras d'Or Pre-Cambrian Rocks.—It only remains to notice the rocks which form the mountain lying between St. Ann's Harbor and Glen and the shore of the Great Bras d'Or, the northern part of which has already been described.*

*Report for 1874-75, page 252, and for 1875-76, page 377.

Gneissic rocks occur near the end of the road to Kelly Cove, at the head of St. Ann's Harbor. East of Big Harbor the brooks exhibit hematitic diorite, gneiss and mica-schist, among which veins holding copper ore and supposed also to carry gold, have been worked in several places to a small extent. In the brook immediately south of the post office at South Gut, diorite and felsite appear, while that flowing to the Great Bras d'Or opposite and others further east show similar rock with syenite.

PRE-CAMBRIAN.

George River Limestone.

A general description of the George River limestone has appeared in previous reports.

Craignish Hills Area.—The outcrops in the southern part of the hills, of which Skye Mountain is the continuation, have been referred to in the Report for 1879-80, page 17, et seq. To the south a considerable portion of the hills consists of unstratified rock, whereas the Whyecocomagh, or north end, although not everywhere showing limestones,—which would seem to run in a northwesterly direction across the country—is all stratified, and will, therefore, be described in this connection.

At the head of Mull River, in some of its branches, red syenite underlies the Carboniferous grit and conglomerate, and is succeeded by banded, argillaceous, slaty felsites and crystalline limestone, which are again seen with quartzites in Kewstoke Brook. Dark-grey compact felsites, seamed with quartz containing hematite, are associated with quartzite and quartz-felsite at the source of Blue's Brook. Dark and light-grey, argillaceous and talcose, compact, coherent, jointed felsites render the brook, lower down, very rough, high, perpendicular banks, jutting ledges and deep pools occurring in gorges, down which the water rushes with great velocity.

Corrugated mica-schist, containing large patches of quartz, in McAskill Brook, above the road at the carding mills. Upstream, micaceous, hematitic, schistose felsite and dark-grey thick-bedded hornblende-rock are succeeded by wavy, crystalline limestone. A variety of the latter contains quartz and felspar in veins and bands; and mica, sometimes in specks sometimes in layers. In this brook is a small cave.

On the top of Skye Mountain are dark-grey argillaceous felsites and contorted talcose schists. In the limestone of one of the branches of Bregand Brook is another cave, accessible for about twenty feet. In the next branch east, dark thick-bedded felsites, in part globular, brecciated, vesicular and porphyritic, contain a vein of quartz four

to six inches wide, which can be traced four feet in one direction, and holds crystals of copper pyrites as heteromorphs of iron pyrites. In the branch which follows a road south from the school at Kewstoke road, white crystalline limestone is associated with brownish-grey compact quartzite, and a dark-grey corrugated limestone, with thin layers of sealy mica, passing into mica-schist, occurs with grey banded felsite and coarse, red syenite, the latter associated, higher up, with a porphyry sometimes containing hornblende and sometimes vesicular and trachytic. In another branch, one mile below the school, compact, thin-bedded, talcose, micaceous and hematitic felsite, seamed with limestone, occurs in narrow gorges with quartz-blotched gneiss full of crystals of iron pyrites. Felsite and quartz-felsite also appear in contact with Carboniferous marl, etc., behind the houses of the Whyecomagh Indian Reserve.

Iron Mine.

At the head of the Iron Mine Brook are large exposures of compact quartz-felsite, felspar mica rock, argillite and pyritous, crystalline limestone containing traces of hematite.

Mullach Crystalline Limestone.—This area is separated from the mountain, on which are the rocks just described, by the valley of Skye River. On the hill near the source of Mullach Brook, bright-red conglomerate is succeeded by massive, grey, flinty quartzite mixed with felsite and softer rocks, traversed by veins of barren, white quartz and passing into gneiss. A dark-grey granular diorite is found in one branch of this brook.

Iron ore with traces of copper.

In another brook of this neighborhood, quartzite, diorite, syenite, compact quartz-felsite, calcareous breccia and crystalline limestone succeed dark Carboniferous shales. A specimen of iron ore, from this locality, analyzed by Mr. Hoffmann,* was found to contain about 50 per cent. of magnetite; and traces of copper pyrites and green carbonate. In the brook immediately east of the village of Whyecomagh is a compact felspar-porphry, above which appear quartzite, red syenite and coarse granite.

Savach Brook.

Garnetiferous schists.

Crystalline Limestone of Middle River.—In Savach Brook, after an interval of about a quarter of a-mile of coarse granite, is a dark, greenish-grey mixture of limestone, hornblende and calcspar, with crystals of calcspar and mica, succeeded by a coarse, grey and flesh-red granite, with a six-inch vein of white, crystalline limestone and about ten feet of banded and contorted, impure limestone with a corrugated surface, on which appear thin layers of quartzite. This is associated with gar-

*Report for 1879-80, page 174.

netiferous tale, mica- and hornblende-schists. Some of the granite has patches of quartz and felspar one foot square; frequently, however, the constituents are finely mixed. Granite and gneiss then follow for some distance, and scattered through the body of the rock are crystalline and semi-crystalline, minute wine-colored garnets and tabular plates of labradorite, showing the characteristic, sky-blue, purple and violet iridescence. About one mile from the river is another band of white crystalline limestone, above which to the fork the granite and gneiss again appear. In the south branch they are soon succeeded by compact and granular felsite and quartz-felsite—dark-grey, greenish, flesh-red, pyritous, porphyritic, hematitic and jointed, often pearly, epidotic and talcose, veined and blotched with quartz and calespar, and passing into quartzite, etc. In the north branch the granite and gneiss are succeeded, half a-mile above the fork, by Coxheath felsites, which continue to its source.

Garnets and labradorite.

In the river, half a-mile above the confluence of Savach Brook, granite, syenite and schists are overlaid by an interesting patch of indian red, Carboniferous grit and coarse conglomerate. Immediately below Fionnar Brook a four-inch band of crystalline limestone is interbedded with gneiss and granite; while in the bed of this brook occur alternations of granite, syenite, quartzite, felsite, quartz-felsite, mica and hornblende schists. Half a mile above Fionnar Brook are other outcrops of crystalline limestone. At one point the following descending section is presented, the strata having a nearly vertical northerly dip:—

Sections in Middle River.

	FEET. INCHES.	
1. Crystalline limestone.....	10	0
2. Dark steel-grey, calcareous, fine, micaceous and hornblende quartzite or schist.....	1	3
3. Laminated, crystalline limestone with specks and small patches of yellow and silvery mica.....	0	6
4. Laminated, dark-grey quartzite as above.....	2	6
5. Crystalline limestone.....	1	0
6. Quartzite or schist as before.....	5	0
7. Crystalline limestone in bands.....	15	0
8. Flesh-red and reddish-white coarse granite, containing a large proportion of quartz and felspar, but little mica. Thickness perhaps.....	10	0
9. Quartzite or schist as before.....	2	6
10. Limestone.....	1	6
11. Coarse, red granite, which seems as if overlying unconformably the foregoing strata and extends from bank to bank.....	0	0
Total thickness.....	49	3

Higher up another section of these rocks is presented, the intervening strata being garnetiferous schists, limestone and granite.

	FEET. INCHES.	
1. Coarse, white granite and syenite passing into quartzite.	20	0
2. White, semi-crystalline quartzite, in thin beds, full of specks of a light-grey, crumbling, brittle mineral, which yields a dark streak, seamed across the bedding by small veins of calcspar.....	5	0
3. White, coarse granite with a large percentage of silvery mica.....	2	0
4. Crystalline limestone with small veins and layers of white, vitreous quartz.....	12	0
5. Alternating bands, varying from 6 to 18 inches in thickness, of limestone, dark-grey, hornblendic, micaceous quartzite, white and reddish granite and hornblende-schist.....	12	0
6. Crystalline limestone.....	4	0
7. Alternate bands of light and dark-grey quartzite and crystalline limestone.....	9	0
8. Banded, crystalline limestone.....	6	0
9. Reddish-white granite and crystalline limestone.....	5	0
10. Dark-grey, micaceous and hornblendic, banded and laminated, soft, crumbly quartzite, with greenish bands.....	11	0
11. Impure, crystalline limestone, containing quartz and mica; interstratified with mica- and hornblende-schists.....	25	0
12. Measures concealed. Blocks of schist, slightly hematitic.	0	0
13. Laminated, bluish-grey and white, crystalline limestone.	0	0
Total thickness.....	111	0

McKinnon
Brook.

Crystalline Limestone of Ingonish.—At the highest of the small lakes on McKinnon Brook is an outcrop of whitish, broadly crystalline limestone. After passing over two miles of syenite in Ingonish River, above this brook, a belt of gneissic rock is reached, about two miles and a-half wide, comprising various mixtures of felsite, limestone, quartzite, syenite and diorite in alternate bands, which weather into corresponding ridges and furrows. Layers, from three to eight feet thick, of light-brown felsitic-limestone, serpentinous felsite, pyritous hornblende-rock, slate-colored quartz-felsite, quartzite, crystalline limestone, hornblendic and mica-schists, mottled, chloritic, quartzose syenite and granite, with hematite in the joints, and various combinations of these rocks are mingled in great confusion at the upper part of this belt. In a small brook which enters on the north side, crystalline limestone, diorite and other granular rocks are confusedly mixed with dark-grey diorite or hornblende-schist, veined with red syenite,

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ito.

FEET. INCHES.

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and containing masses of calcite, which are apparently not continuous. At the foot of a sixty-foot fall, bluish-grey, whitish and reddish, finely corrugated gneiss is completely surrounded by massive rock without foliation.

Blocks of crystalline limestone also indicate the occurrence of this formation in Power and Clyburn Brooks, near the settlement. Other ^{Power and Clyburn Brooks.} outcrops among the gneisses further north have already been referred to.

G.

Carboniferous—Conglomerate.

Conglomerate.—At or below the base of the lower Carboniferous in several places occur strata which like those of Graham River,* have been greatly altered by the intrusion of igneous rocks. They frequently resemble the supposed Devonian rocks of Madame Island and Guysborough county,* but are more probably, for the most part at least, Carboniferous, although they invariably underlie the limestone and plaster. The more important of these rocks as they occur at Mabon Coal Mines, Strathlorne, Southwest and Northeast Margaree and Cheticamp will be first described.

In the brook which follows the road to Mabon Harbor from the coal ^{Mabon Coal Mines.} mines are bluish-grey, purple and greenish shales, vertically interstratified with quartzite and conglomerate, all more or less slaty, very coherent and apparently altered by the felsite breccia and diorite of the neighborhood. Lower down the brook, red Carboniferous conglomerate overlies, perhaps unconformably, and is soon followed by a light whitish-grey limestone.

On the seashore opposite the school is a prominent boss of quartzose rock or quartzite of great variety of color and texture, having on both sides altered red slates which appear as if lapping unconformably round it, in which case there would be two series of rocks in this little outcrop. It is much more probable, however, that the quartzite is the bottom bed of an anticlinal fold which brings the slates all round it, the neighboring conglomerates and grits being also greatly altered. On the southwest side of the quartzite the red slates dip regularly S. 20° W. away from it, as if crossing the stratification of the adjoining gypsum.

In a branch of Broad Cove River, purplish, somewhat coherent ^{Volcanic rocks.} argillaceous shale and grit are broken through by greenish-grey nearly compact trap. Higher up is a coarse conglomerate, with a great cliff of fine diorite and dark, epidotic calcareous, trap, succeeded by reddish

* Report for 1879-80, p. 104 F.

* Report for 1879-80, p. 32 F.

and greenish flinty sandstone and reddish, slaty, friable, micaceous altered shale. Further east, near Strathlorne, is a long steep ridge of trap which has altered the surrounding reddish-grey sandstone, grit and conglomerate in a very marked manner, while at the bottom of the hill soft rocks occur and limestone is present in an adjoining brook. The roads in the vicinity of Murdoch Campbell's are covered with blocks of compact or fine grained sandstone or quartzite.

Broad Cove
chapel.

In the brook which crosses the road near Broad Cove chapel, grey and bluish-grey: fine, calcareous shale or impure limestone is first seen with argillaceous shale and shaly micaceous sandstone, succeeded higher up by greenish and rusty-grey, fine and coarse coherent sandstone. Above the grist mill is a hill of similar sandstone or quartzite, associated still higher with roughly bedded grit, forming rapids and falls.

Lake Ainslie.

Some of the streams on the east side and at the head of Lake Ainslie, including Trout and Glenmore brooks, are occupied in part by similar rocks, grits and silicious sandstones being very abundant. In Matheson Glen and near the tannery on the S. W. Egypt road these are accompanied by blocks of vesicular amygdaloid.

Mt. Pleasant
Brook.

The soft marls and gypsum of the lower part of Mount Pleasant Brook are succeeded by reddish, flinty, compact, felspathic and quartzose sandstone, grit and conglomerate, resembling those of Hume River and underlaid up-stream by Pre-Cambrian felsites and quartz-felsites.

Margaree Big
Brook.

The grits in the glen of the Big Brook are grey, fine and compact, flinty and quartzose. Similar metamorphic rocks lie in and near Galant River; and the amygdaloids on the Marshbrook road in the small brook at John McLeod's are probably, in part at least, Carboniferous.

Forest Glen.

On the road from Big Intervale to Grand Etang through Forest Glen the Carboniferous rocks of the narrow valley between the felsites comprise chiefly reddish and bluish-grey sandstone and grit, associated with trap. In Pembroke Glen amygdaloidal trap and sandstone, occur and on the roads back from Mederic Au Coin's at Cheticamp, altered micaceous sandstone, grit and conglomerate are met with.

Farm Brook.

In the Farm Brook, above the crossing of the road to Tom Pembroke's, is a fine exposure of grey, greenish and reddish argillaceous shale or marl with layers of calcareous, ripple-marked sandstone, beyond which a grit hardly distinguishable from syenite and granite is underlaid by softer, regularly bedded rocks with other bands of the altered grit and very micaceous quartzite. Higher still, after a long interval of Pre-Cambrian syenite and diorite, outliers of trap and sandstone again appear.

Grand Etang.

In the brook flowing into the east side of Grand Etang, light-grey,

micaceous, fine, flinty quartzite, sandstone and grit, dipping at a high angle, overlie the Pre-Cambrian rocks and are associated with traps, while the brooks at the head of the pond show grey, reddish and purplish, micaceous sandstone and shale sometimes containing fossil plant remains.

Similar traps and sandstones in the brook at the Cheticamp copper mine, north of the Farm Brook are stained with copper. The lower part of Fisset Brook flows in meadows. It then cuts greatly altered red and green, nearly vertical sandstone and grit, and becomes very rocky and narrow. A short distance higher up stream there are two magnificent falls. With the altered rocks are associated traps and diorites, full of calcespar, and large outliers occur among the syenitic rocks in both branches. On the north side of the Cheticamp River to the head of the settlement, grit, sandstone and conglomerate underlie the gypsum.

Southwest Mabou River, above and below the bridge at the McLeod Settlement, exhibits quartzite, sandstone and coarse, glistening quartz, felspathic grit, light-grey and micaceous, seamed and spotted with quartz and much broken and jointed, dipping N. 31° E. < 18°, but variable. Further down, reddish grit is succeeded by alternations of red and green mottled, friable: argillaceous shale, dark-grey shale and concretionary sandstone.

Hume River displays an interesting series. Not far from the shore reddish-grey, coarse, egg-conglomerate, without evident bedding or in massive beds, is associated with grit resembling that of Southwest Mabou. The large pebbles are generally of syenite, the grains of the grit consist of quartz, felsite and silvery mica. Crumbling, red and green, mottled, argillaceous rocks, with harder concretions, are mixed higher up with reddish-grey sandstone, grit and conglomerate intersected by minute veins of highly crystalline quartz. and small falls abound in the lower part and the beds strewn with great blocks, while the upper part is creekly and yields a considerable quantity of marsh-hay. Between the river and the shore at Bucklaw school-house, hardwood grows on the slopes which are covered with conglomerate, whereas the hill top is a barren, underlaid by Pre-Cambrian felsite and quartzite, a great part of which does not support a single tree.

In McNaughton Brook, bluish-grey, jointed, slaty, micaceous, argillaceous shales, with small calcespar veins, are succeeded by greenish shale, concretionary limestone and calcareous sandstone; and higher up, by red argillaceous shale, underlaid by fine, ripple-marked, flinty sandstone, with concretions of reddish limestone. The rocks resemble those of Upper Southwest Mabou, and flinty sandstones

extend across to Lake Ainslie. In the eastern branch of this brook grey conglomerate and coherent grit are underlaid by diorite and other Pre-Cambrian strata. On the neighboring hills are blocks of trap probably derived from the dykes to which these strata owe their alteration.

Broad Cove
Chapel Brook.

Fossil plants.

Southwest
Margaree.

Outlet.

In the Broad Cove Chapel brook, above the mill, low land and soft rocks give place to rough hills and the greenish, grey and white fine sandstone or quartzite, associated with purplish, greenish and bluish-grey, flinty, micaceous shale or slate of the falls. In one of the brooks of this neighborhood an obscure *stigmara* was found, and many of the more friable shales contain minute fragments of carbonized plants. The sandstones are sometimes broken by joints into large rectangular blocks. A back lands road running down a very romantic valley to Southwest Margaree, exposes compact, white-weathering, quartzose and felspathic sandstone. On the main road up Southwest Margaree, from the junction of this road to the Outlet of Lake Ainslie, grey and rusty grit, shale and sandstone crop out, whereas on the opposite side of the river the strata are bright-red, the river being apparently the boundary between the two series. In a brook not far below the outlet, rusty crumbling sandstone contains carbonized plants, but gives place higher up to reddish conglomerate and grit.

The glen and pass through which the post road runs from Southwest Margaree to Broad Cove Marsh is perhaps a basin of soft rocks between the lower rocks of the hills. On this road in the brook near Ronald McLennan's, fine, reddish-grey flaggy, argillaceous sandstone is found.

Lake Ainslie.

In Captain Allan's Brook the first rapids and cascades show grey, flinty jointed sandstone, associated with grey conglomerate and reddish micaceous sandstone. Higher up in the different branches and in other brooks towards Southwest Margaree similar rocks contain calc-spar veins in the joints. At the source of one branch is a small rocky dry lake or barren, precisely like those of Grand River and Loch Lomond, the surface blocks being nearly as quartzose. These and similar strata about Lake Ainslie are typical of a great part of the Carboniferous highlands of this district. In a field north of Loch Ban is an outcrop of fine, grey, shaly sandstone; while in Dunbar and other neighboring brooks, grey conglomerate and associated rocks are present.

Coady Settlement and Big
Brook.

Fine, grey, sandstone and grit occur in several branches of Big Brook and reddish sandstone in Angu's Brook. The road to Coady Settlement is comparatively level for about 700 yards from Southwest Margaree showing only a few blocks, beyond which point there is a steady ascent of a hill which becomes much steeper to the north-east in which direction the foot of it runs. Up this hill a short distance

is flinty sandstone, associated further out with conglomerate and grit. The rocks on the road down the Big Brook slope are more friable. The left bank is steep and the hill extends nearly to the Forks. Red marl dips up stream at the bridge in Hugh Gillis Brook, above which it falls steeply over alternations of red, reddish-grey and grey shale and sandstone, often flinty and dipping to the northward as far as the head of the brook. In some parts of these hills the succession seems to be an ascending one to the shore of Chimney Corner, but this is not probable.

Timmins Brook displays at the road above Doyles' bridge, fine ^{Coolavee.} sandstone containing a little mica. The steep, rough track up this brook to Coolavee passes over rocks like those so often described, and in Patrick Munro's Brook similar rocks also occur. From the mouth of Timmins Brook, down the right bank of the Northeast Margaree River to the forks, these rocks form a hill which extends thence far down to Margaree Harbor.

Less altered rocks, without Traps.—The ridge between the Baddeck ^{Baddeck.} River and the salt water of St. Patrick Channel and Baddeck Bay, and the hills near Peter's and Morgan Brooks are for the most part probably occupied by rocks which underlie the gypsum and limestone; but as there are few outcrops from which to determine the structure, this is uncertain. Conglomerate forms the nucleus of the highland east of Baddeck Bay, while gypsum and limestone fold round its base; and it again appears at the North River of St. Ann's.

The coal of the Hunter's Mountain* is found in a brook, among grey ^{Coal of Hunter's Mountain.} sandstone, grit and conglomerate of this age, associated with bituminous shale and marl not well exposed.

Indian-red and grey conglomerate and sandstone overlie the felsites ^{Middle River.} of the Black and McKenzie branches of Middle River. In Morrison Brook similar rocks, are seen in the cascades of the beautiful valleys above the Margaree road, and bluish-grey argillaceous shale in some of the lower branches. In McLeod Brook far up among the gneisses and other Pre-Cambrian rocks is a small, outlier of conglomerate composed principally of pebbles of pearly, aluminous, felsitic and chloritic shale, cemented together in a paste of the same material or of fragments of red argillaceous shale. A similar outlier in the main River has already been described.

The irregular manner in which the Carboniferous and Pre-Cambrian rocks are spread over the hills between Middle River and Lake Ainslie and Southwest Margaree is remarkable. The boundaries have not

*Report for 1876-77, page 454. Mr. Brown in his "Coalfields of Cape Breton," p. 37, assigns this coal its true geological position.

been traced in detail, but can be depended on wherever they cross brooks and roads. In this district the felsite is unconformably covered by Carboniferous strata, appearing only when the latter are cut through on the slope of the hills or in the brooks. The Gairloch Mountain road displays grey and bright-red sandstone and grit.

Mabou River.

Green Point.

Dykes.

Northeast
Mabou.

Mount Young.

Hay River.

Lake Ainslie.

Mullach
Brook.

From the mouth of Mabou River to the lobster factory, blocks are found, of the red and reddish Carboniferous conglomerate, which rises into cliffs in the bay outside the breakwater and forms Green Point, dipping seaward at a high angle. Certain surfaces are striated, perhaps by modern ice, in various directions, some of the striae being very short. The longer ones run NW. and N. 25° W., and the rocks are also rounded and polished. Massive cliffs of conglomerate then follow the high rocky shore, but at the head of some of the bays the overlying plaster and shales appear. In one of these bays, cliffs of gypsum and marl are backed by red marl and fine sandstone, cut into caves and arches, and containing a mass of greenish, impure, concretionary limestone traversed by thin streaks of green marl. Lenticular dykes of dark-greenish, rusty-weathering, crumbling diorite, varying from ten feet to a few inches in thickness, alter the conglomerate, but never for more than a few inches from the point of contact. Beyond a line of inaccessible cliffs come the coal measures which will hereafter be referred to.

On the hill between the school at Northeast Mabou River and the Mabou stage stables, fine reddish-grey sandstone detritus is found, and reddish soft shales in the river.

Bluish and reddish-grey, rusty and bright-red micaceous sandstone and shale occur near Brook Village. Light-grey and whitish quartzose, flaggy and false-bedded sandstone are found about Mount Young with red sandstone and shale. In one of the brooks similar alternations contain layers of impure limestone. About Hay River glistening quartzose grit sandstone and conglomerate are occasionally met with, dipping, as shown on the map. On the shore of Lake Ainslie, on the headland which forms an extension of the Mount Young highland, between Hay and Black Rivers, are good exposures of bluish-grey rusty-weathering very fine sandstone, and shale like that seen near the bore-holes. The dip is obscure and no carbonized plants were seen here. On the ridge towards Black River rusty-grey conglomerate is well exposed. Gypsum and limestone are very abundant near the shore of Loch Ban, but the greenish-grey argillaceous shale found in the neighborhood resembles that cut in the borings.

In Mullach Brook, reddish and purplish, fine sandstone extends above the road to the contact of the Pre-Cambrian strata, a high rugged hill being to the southward. The conglomerates about Skye Mountain are for the most part red and friable, holding,

among others, pebbles of crystalline limestone and quartzite. In Glen Ainslie a few outcrops occur of light-grey, greenish and brown, slightly rusty, fine-grained, calcareous sandstone. In the beautiful brooks in the neighborhood of Whyecomagh these rocks are well exposed. In that near the tannery, limestone occurs near the shore, with red conglomerate, sandstone, argillaceous and arenaceous shale. Higher up compact, felspathic shale and cherty, greenish-grey and reddish calcareous sandstone and grit form precipitous cliffs. Dark calcareous shales with bands of sandstone are also found in this brook as well as those which cross the road in the village of Whyecomagh. The top of Salt Mountain is conglomerate which also comes to the shore at several points round its base, and on the backlands road between Salt and Lewis mountains, is associated with grey argillaceous shale and light-greenish-grey, white-weathering, nearly compact, felspathic sandstone.

In the large brook east of Salt Mountain are beds of dark-grey, micaceous, jointed argillaceous shale, with obscure impressions of *Naiadites*, dipping N. 84° W. < 15°-65°, with cliffs of conglomerate and flaggy argillaceous rock. Higher up, the rocks become more compact and felspathic, and are intersected by small veins of quartz, in some of which hematite is found. In the upper branches conglomerate prevails, usually containing pebbles of syenite, felsite, quartzite and mica-schist.

Four miles from Whyecomagh, dark-brown conglomerate is on the shore in contact with contorted, talcose felsite, containing serpentinous matter and mica, these are soon, however, again succeeded by coarse and fine hematitic grit and conglomerate. About three miles above Little Narrows is an exposure of pink, coarse grit and fine red conglomerate, broken, jointed and hematitic. On the shore near Little Narrows, grit and conglomerate are on end striking N. 80° W. On the point are thin beds of light-brown or red sandstone, grit and marl. The sandstone is ripple marked and micaceous, shows a thickness of about ninety feet, and dips N. 44° W. < 35°.

The valleys in the vicinity of Brook Village, Skye and other glens seem to be in synclines of higher rock than appears in the adjoining hills. In McQuarrie Brook grey and greenish-grey, soft, argillaceous, micaceous sandstone, often covered with carbonized plants and fucoids, occurs with shales. Fine grey sandstone is found to the north-eastward on the roads about Malcolm Walker's; and on the shore of Lake Ainslie, at the end of one of these roads, greenish and dark-grey ripple-marked sandstone and shale dip S. 55° E. < 10°. The borings made here in search of oil, indicated by engines, derricks and other apparatus, are probably in this formation. At one of them, on the

Skye Mountain.

Bituminous shales.

Salt Mountain.

Fossils.

Iron ore.

Brook Village.

Fossils.

Borings for petroleum.

shore, from which oozes a brackish water, tasting strongly of petroleum, fine greenish-grey sandstone dips N. 73° E. at a moderate, variable angle. Out of others greenish shale debris has been brought, but there is no sign of petroleum near any except the first mentioned.

Lake Ainslie.

At the chapel pieces of sandstone not unlike the millstone grit of the Sydney coal field lie about, while south of the chapel and elsewhere in the neighborhood, grey, reddish and greenish-grey, fine sandstone and shale are occasionally seen. The dip is shown on the map wherever it has been ascertained, but meadows and marshes follow the course of many of the brooks. In that near the postoffice, a short distance above the road, reddish-grey fine sandstone dips N. 65° E. < 15°, and is striated in a northwesterly direction. Up stream, banks of grey and bluish-grey argillaceous shale have the same dip; while the wavy micaceous ripple-marked sandstone and shale which alternate higher still have a variable dip. On the lake shore, at the mouth of this brook, grey, greenish, rusty, red and purple argillaceous shales dip N. 15° W. < 75°. This anomalous dip may possibly be due to a slide of the high bank, but this is unlikely. In the bedding are two streaks of red hematite, a quarter of an inch thick, which seem to be persistent. The shales are soft enough for slate pencils; sometimes they are coaly and include thin bands of yellowish-grey limestone, while the structure of certain layers is like underclay.

Limestone.

On an adjoining point are cliffs of light-grey, slightly bituminous, shaly, wrinkled limestone, about ten feet thick, probably overlying the shales. Some layers are bluish-grey and purer than others. It is traversed by veins of calc spar and underlaid by conglomerate, grit and sandstone; composed of quartz, felsite and syenite; beneath which lie grey, fine micaceous sandstones, ripple-marked and covered with fucoids.

Fossils.

In the large brook further south which enters the lake north of the syenite hill, layers of greenish, reddish and purple sandstone and shale hold irregular, nodular masses of bluish-grey, flinty, concretionary limestone.

In the millbrook, at the head of Lake Ainslie, conglomerate, grit and calcareous shale contain small veins of quartz and films of red hematite. In McKay Brook the conglomerate is composed of pebbles of syenite and felsite from the size of a hen's egg downward, and occurs in thick beds with jointed grit.

Trout Brook exposes buff-colored fine conglomerate and grit in its rocky valley. The country between the head of the brook and Hume River is barren and full of marshes. Fine argillaceous, sandstone and grit occur on some of the branches; and in the Millbrook are bluish,

greenish, grey and red argillaceous, sandstone, shale and conglomerate, jointed, broken, and often calcareous.

Reference has already been made to the rocks of Southwest Margaree River. In the brooks north of Mount Pleasant the rocks of which the dip is indicated on the map are reddish and greenish shale and fine grey quartzose sandstone. In the lower part of some of these brooks occurs an impure, grey concretionary limestone, with black, graphitic surfaces. Below the chapel, red and bluish-grey shales are succeeded in Cameron Brook by micaceous shaly sandstone, underlain by sandstone, grit and conglomerate. In the vicinity of Collins' Brook sandstone and fine grit are seen. On the left bank of the river, just above the fork, soft, ripple-marked sandstone, shale and marl occur.

Below Margaree Forks good outcrops of mottled shales, grey and rusty fine sandstone and concretionary, calcareous rock are found in Hugh Gillis' Brook, which probably belong to this series. In the brook directly opposite and in others on the east side of Margaree River, bluish-grey felspathic sandstone and argillaceous shale, with minute veins of calspar accompany grit and conglomerate.

In Galant River, below the Marshbrook road, limestone is found with greenish and reddish micaceous sandstone, and shale, grit and conglomerate. In the tributary which enters just below this road, grey calcareous sandstone, grit and shale are associated with black calcareo-bituminous shale, covered with fish-remains, shells, etc., succeeded higher up by red marl. Above the Marshbrook road, grey, coarse, heavy-bedded sandstone, fine, micaceous, crumpled grit, indian-red conglomerate and bluish-grey argillite overlie the reddish syenite and felsite which occur higher up. Throughout nearly its entire length this river flows among these rocks, which also occupy the hills between it and the shore road.

The patches at the mouth of Trout and Jumping Brooks are thus described by Professor Hind:—"Mottled sandstones and conglomerates rest unconformably on white and mottled sandstones and bituminous shales, supposed to be of Lower Carboniferous age. These latter rest unconformably, the first on red metamorphic rocks, the second are seen in close proximity to red, green and black corrugated schists, supposed to be of lower Silurian age."* The first group here seen represents the limestone series, the second the conglomerate, while the schists have been described as Pre-Cambrian, although Professor Hind has not included them in his "gneissoid series." but concludes that they represent the summit of the gold-bearing rocks of Nova Scotia.

* Sherbrooke Gold District, 1870, p. 71.

Pleasant Bay. Some of the strata at the head of Grandanse and Red Rivers of Pleasant Bay represent the conglomerate series probably. To the northward, sandstone, grit and conglomerate extend along the shore, the sandstone containing many carbonized plants. Near Poulet Cove reddish-grey, coarse, compact grit, altered, quartzose sandstone and conglomerate are interstratified with black crumbling, micaceous shale and fine sandstone. The boundaries of the formations on this coast are defined on the map, and require no particular remark.

Meat Cove. At Meat Cove light and dark-grey, rusty and greenish, heavy-bedded, fine-grained sandstone and grit, semi-crystalline and micaceous; dark grey and black micaceous argillaceous shale and grey calcareous sandstone are veined with calcite and serpentine, and the finer beds are very much contorted. Similar rocks occur about the Lowlands. In Meat Cove Brook bluish argillaceous shale and reddish micaceous, fine sandstone, are accompanied by conglomerate and grit.

Salmon River exposes reddish sandstone, grit and conglomerate, with calcareous shale, overlying the felsites. In the lower part limestone and sandstone are found.

North Aspy Glen. In the upper part of Cape North glen the conglomerate comes from beneath the limestone and gypsum; and in the beautiful valley of Wilkie Brook, strata probably of this age, consisting of grey, micaceous sandstones, like those of Bay St. Lawrence, with bluish-grey and blackish bituminous shale, containing coaly matter, cap the red syenite and other Pre-Cambrian rocks. They are fine, micaceous, flinty and friable, sometimes calcareous and cut by calcspar veins.

Ingonish. The Carboniferous limestone appears on the shore at Ingonish, while further inland the conglomerate runs far up the glens in narrow belts. In the brook running into the north side of Warren Lake fine grit, conglomerate and sandstone, reddish and grey, crumbling and nearly horizontal, pave the brook for a considerable distance, and are succeeded by reddish-grey granite and syenite.

North River of St. Ann's. The distribution of the Carboniferous rocks about the Tarbet, Oregon and North River will be understood from the map. At several points in the Elder's Brook blocks of red conglomerate occur, although the country rock is syenite; and as the valley is wide and level, it is probable that they indicate a former extension of the conglomerate up this brook. Above John Morrison's also—the highest settler on the Barasois River—a narrow belt of level land occupies the western bank for about three miles, cut here and there by runs of the river, and affording pasturage for cattle. This has probably been at no very distant date occupied by Carboniferous rocks. Near John Morrison's, bright red soil extends for a considerable distance up the glen, indicating

that these still overlie the syenite at this point; though the river runs over a rough bed of Pre-Cambrian rocks.

Limestone.

The general characteristics of the marine limestone, gypsum and associated crumbling marls, sandstones and other rocks of this series have been described in previous reports, and their distribution will be better understood from the map than from any lengthy enumeration of the various outcrops.

About one mile south of Rear Judique post-office, in Little Judique Brook reddish and grey, fine-grained, crumbling, flaggy sandstone is in place with mottled argillaceous shale and marl, wavy and spotted, sometimes grey and concretionary. But the exposures in this neighborhood are not numerous.

Smith Island displays interesting outcrops unconformably overlaid by the lowest beds of the coal measures. The strata first obscurely seen north of Smith Point are grey sandstones dipping S. 61° W. < 15° to 25°. Further west, red rocks forming cliffs and reefs are followed by plaster cliffs, and the country from shore to shore is broken by pits. The plaster appears in great masses among soft shales, and at one point a three feet bed of grey, bituminous, fossiliferous limestone is interposed between two layers of gypsum, a fibrous selenite being between the limestone and the upper bed. The gypsum seems to strike against a bed of oolitic limestone, 12 feet thick, running vertically N. 15° E., and succeeded on the west side by alternations of gypsum, marl and limestone. The red marls contain masses and irregular beds of gypsum and limestone, and are traversed by reticulating gypsum veins. Some of the limestones are beautifully marked on the upper surface by fucoids; others are full of shells of the usual character; they are in places lenticularly bedded with the gypsum, which veins, or is intimately mixed with them, while in other cases the two rocks are sharply separated. The veins are fibrous and contain small fragments of limestone. On the eastern side of the island red shales with lenticular beds of bluish-grey argillaceous shale and sandstone again come from beneath the grey and rusty sandstone and shale full of coal pipes, which belong to the coal measures.

The limestones of Southwest Mabou and Glencoe are often black and graphitic, oolitic, brecciated and vesicular; and they give rise, like the plaster, to strong springs. In this district none of the altered rocks of Graham River and Judique occur; on the contrary the sandstones are nearly always soft, crumbling, ripple-marked and micaceous; the shales and conglomerates not less so and more reddish and calcareous than those met with at the Strait of Canso.

Fossils.

Near the upper bridge on Southwest Mabou River, thin-bedded, reddish-grey fine sandstone occurs, hematitic and occasionally false-bedded, full of small concretions like coprolites; succeeded lower down by argillaceous shales spotted with calespar, and by a bed of impure bituminous, fossiliferous limestone about one foot thick. In the cliffs a downthrow fault of twenty feet is exposed. Concretionary, hematitic limestone, sealed with clay, occurs among the sandstones, containing fossils, among the most abundant of which are the polygonal plates of an enerinite. Lower down, conglomerate, concretionary sandstone and marls of various bright colors, are associated with pink, orange, white, and grey gypsum, passing in places into limestone which in its turn encloses masses of gypsum and has been quarried to some extent. At one point an impure, vesicular, nodular limestone is overlaid by eighteen feet of alternations of grey shale, mottled marl and sandstone, dipping N. 23° W. < 39° in cliffs. Near the middle bridge, blackish shales contain a great number of curious bean-shaped concretions which weather rusty-brown. The associated shales are beautifully rippled and some of the red varieties have the indentations of the ripples filled with green. The strata are much contorted, exhibiting small anticlines and synclines. At the head of tidewater this river displays reddish and greenish shale and sandstone, often rippled, as well as dirty brownish-grey, oolitic, bituminous limestone, veined with calespar.

Mabou Harbor
Plants.

Half a-mile south of Mabou Harbor, at the end of the sand beach, light sea-green and red, spotted and banded, soft marl and sandstone, with markings of plants, are followed by outcrops of bituminous limestone, vesicular and concretionary or argillaceous and carbonaceous, veined with white and rosy calespar; succeeded by banded, dark-grey, coaly limestone, by gypsum containing crystals of selenite, and marls containing bands of fibrous gypsum sometimes six inches thick. In one of these bands is a compact lenticular mass three and a-half feet long by eight or ten inches wide, of rusty-brown, coarse, soft, arenaceous rock. Sandstone and conglomerate occur further along the shore, thin and thick-bedded, grey and rusty, with beds of underlay. In places these beds are thrown on end and strike about S. 24° W.: they are much contorted, as always happens when plaster is mixed with softer rocks. Mottled marl, calcareous sandstone, limestone, rusty-grey sandstone, grit, and conglomeritic, argillaceous rock with bands of glistening, hard, coaly matter, and upright and prostrate trees then occupy the shore. But the succeeding rocks will be described in treating of the Port Hood coal measures of which they form a part.

Mabou.

On the south side of Mabou River, immediately above the bridge at Mabou village, light greenish-brown, vesicular, and nodular, conglom-

eritic limestone, about fifteen feet thick is seamed with red calcite. The vesicles are due to the decomposition of sandy, ochreous material or to contraction of the substance of the rock, and are lined with minute crystals. Limestone, gypsum, and red and green marl are found at various points higher up. In the first large brook, about a mile above the bridge, limestone and gypsum are succeeded by grey, bluish-grey, greenish and reddish argillaceous shale and sandstone, with rusty limestone bands; and similar rocks are found in the beautiful cultivated valleys and hills of the neighborhood. Near Elgin Mills, greenish-grey fine sandstone and argillaceous shale are associated with wrinkled, shaly limestone, and higher up red and green shale and marl are met with. Above the gypsum in Glendyer Brook greenish, argillaceous shale and sandstone are seen, and near the head of Mull River, conglomerate, grit and friable, fine, micaceous, rippled sandstone, generally indian-red, but also greenish-grey and seamed with calcite. The different branches of Mabou River present little worthy of notice or that has not been already described in reference to similar rocks in previous reports. The large brooks cut valleys of considerable depth and beauty, the hills on either side rising gently.

In Skye River also typical lower Carboniferous rocks prevail, generally red and crumbling. About two miles and a-half above the bridge on the Skye Glen road, on the north bank of the river, reddish-brown, fine, flaggy, calcareous sandstone and grit are associated with blackish shales indistinctly seen. In the shingle-mill branch the following rocks occur above the Skye Glen road:

1. Reddish-grey fine sandstone with a variable dip.
2. Purple and reddish sandstone and conglomerate.
3. Grey, bluish-grey and reddish argillaceous shale, sometimes flinty and calcareous, covered with fucoids.
4. Bluish-grey, concretionary, oolitic limestone, barrel-shaped in the bedding and spotted with iron pyrites, rusty-weathering, the upper surfaces slickensided and covered with whitish calcspar. No fossils observed. About 15 inches thick.
6. Conglomerate.
7. Bluish-grey argillaceous shale and light greenish-grey, flinty sandstone, dipping N. 50° E. < 45°. Here the valleys are cut very deep.

On the east side of Indian Island, Whycoomagh, gypsum, concretionary limestone and conglomerate are exposed.

Grey and red gypsum and marl crop out on the east side of Little Narrows and on the shore towards Portage. From Portage to the head of Whycoomagh Bay no rocks are in place on the low gravelly shore, but blocks of red, brown and grey fine sandstone are in the banks; and further back, gypsum and limestone abound as well as on all the roads

Salt springs. about Nineveh, Washaback and McKinnon Intervale,* the gypsum being as usual accompanied by salt springs.

Middle River. From the bridge, near the mouth, to the upper settlement, Middle River displays frequent outcrops of shelly limestone, gypsum, sandstone, grit, conglomerate, marl and argillaceous shale, ripple-marked and covered with fucoids, which on the east side extend, in plains broken by plaster pits, to the foot of the hills, where they are underlain by Pre-Cambrian rocks, while on the west side conglomerate intervenes. The Carboniferous rocks leave it at the First Gold Brook to occupy Lake Law, to Northeast Margaree. To a stranger coming from Middle River, Lake Law appears to be the continuation of that river, just as one would suppose McInnes Glen to indicate the course of the Northeast Margaree above Big Intervale, from the greater size of the valley consequent on the presence of Carboniferous rocks. The difference of level between Lake Law and the bed of Middle River is only a few feet.

Lake Law.

The singular manner in which the Carboniferous limestone runs up the glens of the St. Ann's and Baddeck Rivers, proving the existence of the same valleys and hills in Carboniferous time, has been frequently pointed out.

Baddeck and St. Ann's Rivers

On Baddeck Bay there are large quarries of gypsum, and in Peter's and Buckwheat Brooks outcrops of both limestone and gypsum. Above Andrew Anderson's road, Peter's Brook cuts through reddish and grey marl, sandstone and conglomerate, with a westerly dip, associated in slightly contorted beds with calcareous shale and limestone, full of shells and stems of plants, veins of calcespar and films of hematite. Foyle's Brook exposes shelly limestone and, higher up, calcareous sandstone and conglomerate; and similar rocks, veined with calcespar, are found in Morgan Brook.

Baddeck gypsum quarries.

The distribution of this formation about Lake Ainslie and Southwest Mabou will be readily understood from the map, upon which the more important outcrops have been marked. On the point east of Dunbar's mill brook is a grey and rusty surf-eaten limestone. At the head of Doherty Cove, mottled shale and sandstone are in the bank, accompanied, on the next point west, by dark bluish-grey and black, papery, argillaceous shale, apparently without fossils; underlain by grey and whitish shaly and massive limestone, veined with calcespar. For some distance the shore follows nearly on the strike of these rocks which dip at a variable angle inland.

Fossils.

Lake Ainslie.

The high cliffs immediately above the road in Mount Pleasant Brook display red marl with greenish, concretionary layers of fine mica

Black shales.

Mount Pleasant

* Report for 1876-77, page 442.

aceous sandstone bands of dark calcareous shale and grey and bluish-grey streaks of impure limestone. The dip is somewhat changeable, perhaps indicating a fault. With these are associated impure gypsum and gypseous marl, while higher up in the Big Brook, and also in its branches, are the metamorphic, Carboniferous rocks elsewhere referred to. In the small brooks north of Mount Pleasant, red, grey and greenish, micaceous, calcareous sandstone and argillaceous shale are found with limestone.

Patrick Munro's Brook flows through a mound of gypsum seventy feet high into the Northeast Margaree River in which also ^{Northeast Margaree.} many other outcrops occur. Associated with limestone and gypsum to form the Hogsback is a bluish-grey shale, full of *Stigmara*. ^{Plants.} The distribution of the Carboniferous rocks around the Sugar-loaf and in Forest Glen will be seen on the map. At the head of McInnes Glen, gypsum and grey, impure, shelly limestone run in a narrow belt bounded on both sides by hills of Pre-cambrian rock; and sandstone, shale, marl, limestone, and gypsum exposed in all the roads and streams about Margaree Plains or half-barren pastureland characterize large tracts of country underlaid by these rocks at the Garry, Middle ^{Plains.} River, Big Brook, Northeast Margaree and elsewhere.

On the sea shore north of Broad Cove River, coarse, yellowish-brown ^{Broad Cove.} sandstone is first seen, giving rise to a sandy soil, in color like that about Strathlorne, succeeded by red, yellow and white marl. Indian-red sandstone and shale then occur at intervals for a considerable distance, associated with a coarse, red, silicious sandstone, with harder ^{Contact of the coal measures.} concretions, white patches and coaly streaks. Gypsum then appears in cliffs with red marl and limestone as far as the mouth of the Chapel Brook which is occupied by red marl and sandstone, as far as the road. In the cliffs to the northward, red and grey marl, shale and fine, ripple-marked, calcareous, micaceous sandstone, with a few rusty beds showing carbonized plants, dip generally inland and extend to a large brook in which are reddish-grey, crumbling, argillaceous shale and fine, ^{Plants.} micaceous, wavy sandstone, underlaid up-stream by fine, grey, rusty-weathering sandstone. Similar rocks, often bright-red, occupy the shore from this brook to Marsh Point and include a bed of dark bituminous shale, full of *Cythere*, *Spirorbis* and *Naiadites*, the dip being still inland ^{Shells.} and the rocks overlie those just described. Beyond Marsh Point these strata continue for about a quarter of a mile, beyond which comes grey and rusty sandstone full of carbonized plants and probably belonging to the coal measures.

In the brook south of Donald McLeod's fishing station, bluish and reddish-grey shale and fine, wavy, micaceous sandstone dip north. ^{Broad Cove Marsh.} In the Marsh Brook above Widow Angus Gillis', the fine, grey,

sandstone, shale, grit and conglomerate probably belong to the Carboniferous, conglomerate series, but gypsum is also in the vicinity.

Cheticamp.

The outcrops of this formation on the sea coast south of Cheticamp will be noticed in describing the coal measures with which they are in contact. In the little brooks between Grand Etang and Margaree Harbor, bluish and light-grey argillaceous shale and micaceous sandstone occur with limestone traversed by veins of calcespar.

Au Coin Brook, where it runs parallel with the road, cuts large masses of gypsum. In the Factory Brook, at Cheticamp and Cape Rouge, crumbling marl and micaceous sandstone overlie the felsites.

Pleasant Bay.

Near the Grandanse and Mackenzie Rivers of Pleasant Bay, gypsum and limestone are in place. North of Grandanse River, indian-red, calcareous sandstone, marl, shale and conglomerate are found near the road with crystalline and semi-crystalline, compact, coherent limestone, white and light-grey, arenaceous, and containing grains of white and vitreous quartz as large as peas. In the same neighborhood the land is broken by plaster pits. On the shore, for some distance west of Mackenzie River, there is a low belt of cultivated land occupied by grey limestone of varying degrees of purity, brecciated, veined with calcespar and fossiliferous, with a seaward dip at a moderate angle.

Fossils.

Black Shales.

The rocks of the shore north of Pleasant Bay consist principally of reddish and greenish sandstone, grit and conglomerate, with occasional bands of impure, shaly limestone, veined and blotched with calcespar; and of black calcareo-bituminous shales.

Bay St. Lawrence.

Reddish, micaceous, fine sandstone and bluish-grey argillaceous shale occur on the roads about Bay St. Lawrence; and near the beach are blocks of black concretionary limestone. In some of the fields near the shore the broken nature of the ground indicates plaster.

Aspy Bay.

Immense deposits of gypsum and limestone appear everywhere around the ponds and rivers of Aspy Bay, but require no special notice. On the road east of Effie's Brook limestone appears in patches among the granite and syenite.

Ingonish.

Gypsum, limestone and other Carboniferous rocks occur in the bays of Ingonish. In Rocky Bay they consist of greenish and bluish shale, conglomerate, impure gypsum, limestone and limestone-breccia which come against syenitic rock. The western point of Ingonish Island also displays an outlier of limestone.

North Shore.

The rocks of the North Shore of St. Ann's Bay from Smoky Cape to St. Ann's Harbor are in every respect similar to those just described. In French River grey massive limestone is below the road, while reddish conglomerate occurs in some of the neighboring brooks. On the shore north of Indian Brook are limestone and gypsum, red and grey

grit, sandstone and marl, some of which contain carbonized plants and have been explored in search of coal. Red conglomerate is in place on Island Point near the mouth of the Barasois River, but the shore in this vicinity is generally sandy and low. Search for coal.

MILLSTONE GRIT.

This formation may be represented in the great thickness of strata underlying the coal measures of the Port Hood district and other points on the western coast, but as no want of conformity is anywhere exhibited till the top of the Carboniferous limestone is reached and as the whole area of the overlying measures is small, no attempt has been made to subdivide them and they will therefore be included in the sections which follow and which were measured along the coast.

COAL MEASURES.

The lowest beds of the most southerly outcrop of the Inverness coal field at Little Judique have already been described.* North of Judique they appear at intervals as portions of the rim of a basin which has been nearly destroyed by the sea. Seams of coal of considerable thickness have been worked at Port Hood, Mabou, Broad Cove and Chimney Corner, concerning which details will be given hereafter. In the meantime the strata will be described as they are seen on the shore, beginning at Port Hood. The undulations of the lower Carboniferous and Pre-Cambrian rocks by which the troughs are separated will be readily understood from the following sections and the map.

SECTION OF COAL MEASURES FROM PORT HOOD LIGHTHOUSE SOUTHWARD, IN DESCENDING ORDER.

	FEET	INCHES.	
1. Grey and greenish argillaceous shale. At least.....	6	0	
2. Grey, brownish and rusty sandstone, often coarse, false-bedded, crumbly; with small patches of concretionary limestone; full of pot-holes formed by the waves. A prostrate tree, two feet in diameter, converted into crystalline and oolitic limestone and ironstone, with traces of galena and blende. Hard, concretionary masses and many plants. The sandstone strikes along the shore, for nearly a mile. Thickness probably at least	40	0	Fossil trees.
3. Greenish-grey, soft argillaceous shale.....	1	0	Traces of galena and blende.
4. Coal, hard, with streaks of pyrites.....	0	2	
5. Greenish and grey soft argillaceous shale and underclay.	3	0	
6. Rusty, shaly sandstone.....	1	10	

* Report for 1879-80, p. 110 F.

		FEET.	INCHES.
	7. Greenish and bluish argillaceous shale with coal streaks.	2	2
	8. Rusty sandstone, full of plants and <i>Stigmaria</i>	5	4
	9. Bluish argillaceous shale.....	1	3
	10. Coal in two layers.....	0	2
	11. Dark argillaceous shale with plants.....	2	8
	12. Black carbonaceous shale, 0' 1"; Coal, 0' 2"; Clay, 0' 7"; Coal, 0' 7".....	1	5
	13. Argillaceous fireclay.....	3	0
	14. Coal.....	0	5
	15. Black carbonaceous shale.....	1	0
	16. Grey and greenish argillaceous shale.....	1	0
	17. Measures concealed, probably argillaceous shale.....	10	0
	18. Fine sandstone.....	5	0
	19. Dark argillaceous shale with harder bands.....	2	0
	20. Measures concealed.....	9	0
	21. Alternations of dark argillaceous shale and fine sandstone, broken into small blocks by joints.....	4	3
	22. Compact, rough sandstone with <i>Stigmaria</i> on the upper surface.....	4	4
	23. Measures concealed, probably including a coal seam....	1	9
	24. Arenaceous underclay.....	2	3
	25. Black calcareo-argillaceous shale, with <i>Naiadites Cythere</i> , <i>Spirorbis</i> , plants and fish-remains.....	3	4
Bituminous shale.	26. Coal; local, 0' 1'; Black shale 1' 0"; Coal 0' 1"; Black shale 1' 6"; Coal 0' 4"; Black shale 0' 10"; Coal 0' 1"; Black shale 0' 3; Coal 0' 2; Black shale indefinite..	4	4
Main seam,	27. Measures concealed. Perhaps includes the coal seam worked at Port Hood Mines 6 feet thick.....	35	0
	28. Fine sandstone.....	1	6
	29. Measures concealed.....	53	0
	30. Light-grey flaggy sandstones.....	2	0
	31. Measures concealed.....	50	0
	32. Laminated fine sandstone.....	2	0
	33. Measures concealed.....	2	6
	34. Fine sandstone.....	1	0
	35. Measures concealed, but probably greenish argillaceous shale, with streaks of coaly shale.....	6	0
	36. Grey fine sandstone.....	0	9
	37. Greenish argillaceous shale.....	7	0
	38. Greenish fine sandstone.....	1	3
	39. Greenish and bluish argillaceous shale....	8	0
Trees.	40. Grey, greenish and rusty, fine and coarse, micaceous, crumbly sandstone; patches of coarse conglomerate; contains coal-pipes and trees turned into pyrites, or into a mixture of ironstone and calspar, or of coaly matter and prism-pyramids of quartz. Thickness some- what indefinite as it strikes along the shore for about half a mile.....	115	0
	41. Greenish and light-grey argillaceous shale; sometimes arenaceous and blackened with plants.....	10	6

FEET. INCHES.

2 2
 5 4
 1 3
 0 2
 2 8
 1 5
 3 0
 0 5
 1 0
 1 0
 10 0
 5 0
 2 0
 9 0
 4 3
 4 4
 1 9
 2 3
 3 4
 4 4
 35 0
 1 6
 53 0
 2 0
 50 0
 2 0
 2 6
 1 0
 6 0
 0 9
 7 0
 1 3
 8 0
 115 0
 10 6

FLETCHER.]

NORTHERN CAPE BRETON.

55 H

42. Black shale with masses of limestone, crowded with shells, some of the <i>Naiadites</i> being an inch and a half in length.....	2	6	Bituminous shale,
43. Greenish argillaceous shale.....	15	0	
44. Measures concealed.....	4	0	
45. Light-grey and rusty crumbling sandstone.....	7	0	
46. Greenish argillaceous shale.....	6	6	
47. Grey, flaggy, crumbling sandstone.....	4	0	
48. Greenish argillaceous shale, with thin bands of greenish fine, calcareous sandstone, containing plants.....	10	9	
49. Grey and rusty flaggy sandstone.....	5	8	
50. Dark-bluish argillaceous shale.....	7	3	
51. Ironstone.....	0	2	Ironstone.
52. Greenish argillaceous shale.....	6	0	
53. Measures concealed.....	6	6	
54. Fine, shaly, argillaceous sandstone, with harder bands, passing into thin bedded sandstone, crumbly and blackened with plants.....	70	0	
55. Greenish and grey argillaceous shale, with ironstone bands; dark carbonaceous layers at top.....	34	0	
56. Light-grey, fine, micaceous, shaly sandstone.....	2	6	
57. Greenish, argillaceous shale; not well seen.....	7	6	
58. Coal 0' 2"; Black carbonaceous shale 0' 6".....	0	8	
59. Greenish argillaceous shale; not well seen.....	14	0	
60. Brown, rusty and grey crumbling sandstone.....	9	0	
61. Greenish and grey argillaceous shale.....	6	0	
62. Measures concealed.....	9	0	Lower Carboniferous rocks brought in by a fault.
63. Light-grey and brown crumbling sandstone.....	70	0	
Total thickness.....	710	2	

CARBONIFEROUS LIMESTONE.

	FEET INCHES.	
1. Red crumbling argillaceous shale, with greenish harder masses.....	25	0
2. Measures concealed; probably red shale.....	5	0
3. Soft, shaly, crumbling, crystalline gypsum, whitish and reddish in irregular beds.....	5	0
4. Measures concealed; probably gypseous marl. Mouth of a small brook.....	20	0
5. Marl of various colours, full of veins and streaks of gypsum, some of which are more than an inch thick....	25	0
6. Gypsum, perhaps not continuous.....	3	0
7. Reddish and greenish marl, with occasional thin layers of gypsum and limestone, and veins running in all directions.....	100	0
8. Impure, bituminous limestone, passing into calcareous sandstone. Included in 72.....	..	..
9. Measures concealed.....	22	0

Gypsum.	10. Whitish, crystalline, crumbling gypsum in a broken bank; bedded like the accompanying strata; crystals of selenite in a base of white gypsum, but the crystals are seldom well-formed; sometimes they are so numerous as to obliterate the white gypsum.....	35	0
	11. Reddish and greenish shale, gypseous toward the top, and containing several greenish gypseous streaks in the bedding.....	74	0
	12. Dark, impure, laminated gypsum, containing masses of red marl; veins of white fibrous gypsum throughout, and radiating, crystalline concretions of selenite; sandy spots in places.....	50	0
Little Judique Harbor.	13. Reddish and greenish gypseous marls, veined, and blotched with gypsum, occur in continuous cliffs, the dip of which is obscure; and among them is a 5-foot band of dark, shining, crystalline gypsum and harder shale and sandstone bands. These marls, with rippled, greenish and reddish bands continue nearly to the beginning of Little Judique Harbor. (Susan Creek of the chart.)...	..	..
	Total thickness.....	364	0

SECTION OF COAL MEASURES FROM PORT HOOD WHARF SOUTHWARD.

		FEET	INCHES.
Bituminous shale.	1. Measures concealed by a bank of dark clay and a sand beach.....	46	0
	2. Reef of light-grey sandstone covered with ironstone balls.....	2	0
	3. Dark shale, with traces of coal and underclay.....	12	0
	4. Light and rusty-grey, broken, fine sandstone, often nodular and containing comminuted plants.....	5	0
	5. Bluish-grey argillaceous shale.....	15	0
	6. Light-grey shaly sandstone.....	4	0
	7. Dark bluish-grey argillaceous shale.....	6	0
	8. Black shale with <i>Cythere</i> , <i>Naiadites</i> , coprolites, fish remains and coaly matter.....	0	3
	9. Argillaceous underclay.....	12	0
	10. Grey sandstone veined with pyrites and calcspar.....	1	9
	11. Argillaceous shale, full of coaly matter.....	0	6
	12. Rusty sandy underclay, full of <i>Stigmaria</i> . Local, and passes into sandstone.....	1	2
	13. Sandstone.....	0	6
	14. Alternations of sandstone and shale.....	1	0
	15. Measures concealed. Argillaceous shale sometimes obscurely seen.....	46	0
	16. Greenish-grey argillaceous sandstone and shale.....	40	0
	17. Bluish and greenish-grey shaly sandstone. Dip S. 63° W. <17°.....	10	0
	18. Grey, and bluish-grey sandstone, false-bedded, shaly or in bands 4 feet thick, irregular layers of shale; coaly streaks made by carbonized plants.....	19	0
	Total thickness.....	222	2

The top of this section probably lies about 150 feet below the main seam and is repeated on the shore to the southward of the outcrop of this coal. The measures south of the wharf may also be the same as those north of Isthmus Point, the difference in the two sections indicating a fault.

Correlation of
the rocks north
and south of
Port Hood.

For a distance of about 600 feet north of Port Hood wharf a sand-beach occupies the shore. Then reefs of grey sandstone dip N. 79° E. < 20°. About 200 feet further north an under-clay, with markings of *Stigmaria*, dips S. 23° W. < 20°; but the reefs 45 feet to the westward turn sharply northward. At 1190 feet from the wharf the dip of a sandstone reef is S. 54° W. < 19°, and this seems to prevail as far as the first rocks seen north of the little pond at Isthmus Point, although the land is low and sandy, rendering this doubtfully obscure. Beginning the section from the highest rocks seen on this point, we have the following descending sequence:—

SECTION OF MEASURES NORTH OF ISTHMUS POINT.

	FEET.	INCHES.	Plants.
364 0			
WARD.			
FEET INCHES.			
46 0	25	0	
2 0	22	0	
12 0	90	0	
5 0	..	..
15 0	..	..
4 0	..	..
6 0	..	..
0 3	236	0	
12 0	94	0	
1 9	19	0	
0 6	77	0	
1 2	6	0	
0 6	3	0	
1 0	3	0	
46 0	1	0	
40 0	20	0	
10 0	45	0	
19 0	33	0	Ironstone.
22 2			

	18. Grey sandstone and argillaceous shale; much ironstone.	17	0
	19. Black shale and underclay. A streak.....	0	0
Bituminous shale.	20. Grey sandstone and argillaceous shale.....	34	0
	21. Black shale, passing in places into coal, with alternations of calcareo-bituminous shale and underclay.....	21	0
	22. Greenish shaly underclay, passing downward into red and grey shale.....	33	0
	23. Greenish-grey shaly sandstone.....	30	0
	24. Grey and greenish-grey shale and sandstone. The shale is more or less arenaceous, passes into sandstone, and forms high cliffs.....	120	0
	25. Dark grey argillaceous shale, full of ironstone nodules. Dip S. 28° W. < 17°.....	20	0
	26. Grey rusty sandstone.....	20	0
	27. Grey shale, with dark layers and sandstone bands.....	18	0
	28. Grey and rusty arenaceous underclay, passing into sandstone.....	4	0
Cape Linzee.	29. Dark-grey shale.....	36	0
	30. Grey and rusty massive sandstone, of the bold headland of Cape Linzee, worn by the waves, and a resort of birds.....	51	0
Bituminous shale.	31. Greenish and dark-bluish shale, with a coal streak.....	12	0
	32. Mixed argillaceous and calcareo-bituminous shales, with <i>Cythere</i> , <i>Spirorbis</i> and <i>Naiadites</i>	3	0
	33. Underclay.....	3	0
	34. Alternations of grey and greenish argillaceous shale.....	55	0
	35. Calcareo-bituminous shale, mixed with coaly shale, passing upward into grey shale.....	4	0
	36. Grey, fine, calcareous sandstone.....	19	0
	37. Dark bluish and greenish shale, with black and coaly bands.....	45	0
	38. Sandstone band, with underclay and dark argillaceous and arenaceous shale.....	..	..
	39. Alternations of sandstone and shale, which can be measured in detail, but present few points of interest. Dip S. 9° W. < 17°.....	124	0
	40. Coal, with a band of bituminous shale.....	0	3
	41. Alternations as in 39.....	28	0
	42. Coal.....	0	10
	43. Alternations as in 39.....	44	0
	44. Coal.....	0	4
Bituminous shale.	45. Calcareo-bituminous shale.....	10	0
	46. Argillaceous shale and sandstone.....	15	0
	47. Calcareo-bituminous shale.....	3	0
	48. Alternations as in 39.....	14	0
	49. Red argillaceous shale, containing calcareous concretions. Dip S. 23° W. < 10° to 20°.....	45	0
	50. Red shale mixed with black, succeeded again by red argillaceous shale.....	45	0
	51. Coal worked. Thickness undetermined.....	..	..

17	0	52. Reddish, greenish and grey shale, with coaly streaks...	18	0	
0	0	53. Grey sandstone, forming a reef.....	10	0	
34	0	54. Red rocks, with dark streaks as before.....	53	0	
21	0	55. Reddish and grey fine sandstone, forming a point.....	20	0	
33	0	56. Alternations of grey and rusty sandstone and reddish argillaceous shale.....	50	0	
30	0	57. Reddish-grey fine sandstone, with reddish darker markings; passes downward into gray fine sandstone, forming a rough point.....	106	0	
120	0	58. Bright-brown or indian-red shale, with harder bands and a green layer about the middle. Begins at a large brook in a bay.....	65	0	
20	0	59. Sandstone marked with broken plants. Dip S. 6° W. < 10°.....	48	0	
20	0	60. Reddish shale and sandstone.....	51	0	
18	0	61. Thick sandstone, forming a rocky point. Dip S. 5° W. < 17° to 22°.....	43	0	
4	0	62. Black calcareo-bituminous shale.....	2	0	Bituminous shale.
36	0	63. Underclay.....	3	0	
51	0	64. Red argillaceous shale and sandstone, with several thin dark bands.....	100	0	
12	0	65. Rocks only obscurely seen in the bank. Dip S. 13° W. < 12°.....	29	0	
3	0	66. Reddish sandstone and argillaceous shale, with patches of conglomerate and grit.....	14	0	
3	0	67. Measures concealed.....	86	0	
55	0	68. Grey sandstone, forming reefs.....	55	0	
4	0	69. Measures concealed; apparently red, greenish and grey shales, with thin bands of sandstone. Dip S. 3° W. < 14°.....	20	0	
19	0	70. Shaly sandstone.....	..	..
45	0	71. Measures concealed. Here occurs the beach of Little Mabou pond, past which the first rocks dip S. 60° W. < 21°, making it impossible accurately to estimate the thickness of the concealed interval, even if there is no break. It is perhaps.....	250	0	Little Mabou.
..	..	72. Sandstone, occasionally seen on the reefs.....	55	0	
124	0	73. Reddish, waving, shaly sandstone, passing into greenish argillaceous shale.....	28	0	
0	3	74. Grey, fine sandstone.....	17	0	
28	0	75. Reddish shale and sandstone.....	57	0	
0	10	76. Bluish-grey, grey and greenish fine sandstone, greatly jointed, spotted and streaked with red, marked with plants, thick-bedded, spots of calcspar. Dip S. 54° W. < 16°.....	44	0	
44	0	77. Measures concealed.....	38	0	
0	4	78. Grey and rusty, fine, sandstone.....	11	0	
10	0	79. Greenish and reddish sandstone and argillaceous shale seen occasionally on the reefs.....	45	0	
15	0	80. Red rocks.....	6	0	
3	0				
14	0				
45	0				
45	0				
..	..				

		FEET. INCHES.	
Bituminous limestone.	81. Bluish-grey bituminous limestone, containing <i>Spirorbis</i> ; traces of iron pyrites and hematite.....	1	6
	82. Red argillaceous shale with a few sandstone bands of no great thickness.....	131	0
	83. Greenish, reddish and grey sandstone, forming a point..	137	0
	84. Indian-red shale.....	70	0
	85. Beautiful greenish-grey sandstone, streaked with hematite-red concretions, like agates; sometimes reddish, with green spots.....	54	0
	86. Red shale. Dip W. < 24°.....	60	0
	87. Reddish and greenish sandstone, passing into conglomeritic grit or underclay at bottom.....	25	0
	88. Red and purple argillaceous shale, containing layers of greenish sandstone. Of doubtful thickness.....	20	0
	89. Limestone, gypsum, shales, marls and sandstones that skirt the shore, with very changeable dip, to the beach at the mouth of Mabou River.....	..	..
Mabou River.			
Total thickness.....		3370	11

Smith Island. The structure of Smith Island is very simple. It displays a segment of a basin of the coal measures, unconformably capping the Carboniferous limestone, the contact of the two formations being well seen in the cliffs on both sides of the island. The eastern shore for half a mile north of Portsmouth Point, and the western as far as Susannah Point, show grey rusty sandstone, with plants and prostrate trees and a few bands of grey and bluish-grey argillaceous shale; while for a great distance further, this sandstone overlies on top of the cliffs, the limestones at the sea level. The east shore from Portsmouth Point is on the strike of the rocks which dip westward; but at Susannah Point the dip is southeasterly. This attitude would bring the rocks of Smith Island beneath those of Henry Island, provided no undulation exists between the islands, and consequently the latter ought to form a higher portion of the coal measures. Perhaps very little higher, however, because the strike of the rocks at Susannah Point would carry them, if continued, to Henry Point.

Relation to rocks of Henry Island. The rocks of Henry Island strengthen this view, being similar to the coal measures of the mainland opposite, although they contain no beds of coal. On the shore east of Justaucorps Point, are cliffs of grey, nearly horizontal sandstone and red shale. These rocks extend northward from Fishery Point in alternating layers, forming a segment of a basin similar to that of Smith Island, and of which the lowest rocks occur at Henry Point. The whole thickness seen on the island is probably about 1,200 feet. The presence or absence of coal in the gap between the two islands could be tested by a boring at the north side on or near Henry Point; and the question is one of some importance.

Coal between the two islands.

1	6
31	0
37	0
70	0
54	0
60	0
25	0
20	0
..	..
70	11

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a shore for
as far as
prostrate
ous shale;
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The extension of the coal measures inland at Port Hood is very obscure. Mr. Rutherford states* that the strata underlying the worked coal seam "have been examined over a distance of nearly three-fourths of a mile from the shore; and although several seams were found, none of them exceeded twenty inches in thickness. 360 feet above the seam worked, there is another bed, the thickness of which has not been correctly ascertained, as it is entirely under water; but the crop is occasionally seen when the tide is low, and it is supposed to be not less than six feet thick." One of the seams referred to here, twenty inches thick, is said to have been found in the millbrook, eighteen chains above the shore road, and two smaller seams about twelve chains higher. The country east and northeast of Port Hood is underlain by grey and rusty sandstone and shale, containing carbonized plants. In the Hogsback Brook, flaggy, red, fine-grained sandstone, with plants, is underlain by four feet of dark-grey, dirty, concretionary limestone, in part calcareous, vesicular conglomerate, containing pebbles of syenite and felsite. Grey sandstones also occur in Little Mabou Brook, near its source, where it crosses the old road to southwest Mabou, and are found in the neighbourhood of Southwest Mabou. But no coal has been found among them, and it seems probable that they are older than the coal measures, or represent the barren series of the base of section north of Isthmus Point.

Mabou Coal Basin.—No difficulty is encountered in defining the limits of the coal-bearing strata at Mabou coal mines, the next in order to the northward, the two limited patches at Coal Mines and Finlay Points being sharply interrupted by the gypsum, at a distance in no case more than a quarter of a mile from the shore. The composition and relations of the beds of this series will best be understood by the following sections.

SECTION OF COAL MEASURES FROM COAL MINE POINT SOUTHWARD, IN DESCENDING ORDER.

1. Light-grey, rusty-weathering, crumbling sandstone, dipping N. 25° E. < 46° for about two chains on the shore, then becoming nearly horizontal. It contains coal streaks; a few fine specks of silvery mica; and large, hard concretions, around which the sandstone is arranged in concentric layers. In part blackened by comminuted, carbonized plants and trunks of trees. Patches of greenish calcareous conglomerate and argillaceous shale, extend along the shore for about 28

Coal Mine Point.

* Coalfields of Nova Scotia, p. 27.

	FEET.	INCHES.
chains, forming Coal Mine Point. Dip greatly obscured by false-bedding, but changing to S. 58° W. < 28°, and lower. Thickness consequently hard to estimate, but probably	125	0
2. Rusty underclay of variable thickness.....	0	3
3. Bluish and greenish-grey argillaceous shale.....	22	0
4. Light-grey rusty sandstone	14	0
5. Light-greenish argillaceous shale.....	10	0
6. Measures concealed at the mouth of a brook; but apparently greenish argillaceous shale and sandstone, principally the former	22	0
7. Light and dark bluish-grey argillaceous shale, with ironstone nodules and bands. In places full of <i>Cythere</i> and coprolites. Dip N. 25° E. < 56°.....	33	0
8. Layers of coal and coaly shale.....	7	6
9. Dark coaly <i>Cordaites</i> shale, full of shells.....	1	0
10. Greenish-grey argillaceous shale, with ironstone nodules. Passes at top into dark shale	2	0
11. Dark bluish-grey argillaceous shale, coaly at top; full of shells and plants	4	0
12. Greenish argillaceous shale, full of nodules and bands of ironstone. Passes into dark shale at top.....	24	0
13. Coal and coaly shale. Dip N. 40° E. < 53°.....	2	0
14. Underclay.....	2	0
15. Measures concealed.....	3	0
16. Clay.....	0	6
17. Coaly shale and coal.....	4	0
18. Coal of fair quality.....	2	0
19. Coaly shale, full of <i>Cordaites</i> and lenticular layers of ironstone. Passes in places into coal.....	10	0
20. Measures concealed, including a coal seam which has been worked	21	0
21. Crumbling argillaceous shale, full of ironstone nodules..	32	0
22. Calcareous sandstone.....	4	0
23. Greenish argillaceous shale	43	0
24. Grey, massive, crumbling, false-bedded, micaceous sandstone, with harder concretionary masses. The thickness is indefinite, the dip changing from N. 8° W. to N. 40° E., < 49°-55°.....	325	0
25. Greenish-grey, crumbling, argillaceous shale, with ironstone nodules and layers.....	40	0
26. Coal and coaly shale.....	2	0
27. Measures concealed, including a coal seam that has been worked	7	6
28. Underclay.....	2	0
29. Coal and coaly shale.....	3	0
30. Light greenish-grey argillaceous shale, full of rootlets at top.....	24	0
31. Coal and coaly shale.....	1	6
32. Underclay.....	2	0

Bituminous shale.

FEET.	INCHES.		FEET.	INCHES.	
125	0	33. Dark bluish-grey bituminous, papery shale, with <i>Cordaites</i> and shells	2	3	Bituminous shale.
0	3	34. Light-bluish shale, with nodules of ironstone.....	4	6	
22	0	35. Coaly <i>Cordaites</i> -shale, with hard partings.....	11	0	
14	0	36. Underclay	1	6	
10	0	37. Light-grey sandstone, finely marked with fucoids. More shaly above, and containing a band of argillaceous shale full of ironstone nodules.....	27	6	Fucoids.
22	0	38. Argillaceous shale and underclay, with ironstone nodules	1	11	
		39. Black bituminous shale, with coaly bands	0	9	
		40. Underclay	1	10	
33	0	41. Light-grey sandstone, with streaks of argillaceous shale and ironstone nodules	6	3	
7	6	42. Greenish-grey argillaceous shale, with several layers and many nodules of ironstone	30	6	
1	0	43. Ironstone, argillaceous shale and underclay in bands. . .	1	8	
2	0	44. Light-grey, shaly, waved sandstone, with thin layers of argillaceous shale and bands of ironstone. Crystals of gypsum occur in all the rocks of the vicinity.....	14	0	Crystals of gypsum.
4	0	45. Ironstone.....	0	1	
24	0	46. Dark, papery, argillaceous, bituminous shale, with <i>Naiadites</i> , <i>Cythere</i> , <i>Spirorbis</i> and <i>Cordaites</i>	3	5	Bituminous shale.
2	0	47. Ironstone.....	0	2	
2	0	48. Black shale, like 46.	0	5	
3	0	49. Black, wrinkled, calcareo-bituminous shale, a mass of <i>Naiadites</i> , with a few other shells. Coherent and passed into coaly shale.....	1	0	
0	6	50. Black, papery, bituminous shale, full of shells and <i>Cordaites</i>	0	8	
4	0	51. Underclay	0	11	
2	0	52. Dark-grey arenaceous shale.....	1	1	
4	0	53. Underclay with ironstone nodules.....	1	1	
43	0	54. Light bluish-grey argillaceous shale, with shells.....	2	4	
		55. Alternations of sandstone and argillaceous shale. The sandstone is very micaceous, covered on the surface with fucoids, and in places matted with <i>Calamites</i>	11	4	
25	0	56. Greenish-grey argillaceous shale, passing into arenaceous shale at top	6	4	
40	0	57. Light bluish-grey flaggy sandstone and arenaceous shale	1	4	
2	0	58. Dark argillaceous shale, with streaks of ironstone.....	4	0	
		59. Light-grey argillaceous shale, with a few ironstone streaks and shells.....	2	6	
7	6	60. Ironstone underlaid by and passing into arenaceous underclay.	0	6	
2	0	61. Coal.....	2	4	
3	0	62. Black <i>Cordaites</i> -shale, passing in places into coal.....	3	0	
24	0	63. Underclay	0	8	
1	6	64. Dirty coal.....	0	6	
2	0				

		FEET.	INCHES-
	65. Underclay with thin coaly streaks; nodules of black and coaly ironstone; clay in pockets.....	6	0
	66. Ironstone in nodules.....	0	6
	67. Grey crumbling underclay, with a few ironstone nodules	11	0
	68. Coal.....	0	3
	69. Underclay.....	0	4
Ironstone.	70. Light bluish-grey argillaceous shale.....	2	4
	71. Ironstone.....	0	1
	72. Black and bluish-grey papery shale, with shells.....	1	6
	73. Ironstone in nodular layers.....	0	5
	74. Light-grey arenaceous argillaceous shale.....	2	0
	75. Ironstone.....	0	3
	76. Light-grey arenaceous argillaceous shale.....	2	10
	77. Ironstone.....	0	1
	78. Light bluish-grey arenaceous shales and flags.....	4	0
	79. Light-grey, fine, arenaceous argillaceous, papery shales.....	1	5
	80. Ironstone, passing into arenaceous shale.....	0	2
	81. Light bluish-grey argillaceous shale, with three bands of ironstone $\frac{1}{2}$ - $\frac{1}{4}$ -inch thick.....	4	0
Bituminous shale.	82. Ironstone, 01. Bluish shale, 04. Ironstone, 01.....	0	6
	83. Dark bluish-grey and black, papery, argillaceous shale, full of <i>Natadites</i> and <i>Cythere</i>	1	4
	84. Light-grey argillaceous shale, with a few shells and two streaks of clay.....	1	1
	85. Ironstone.....	0	2
	86. Dark shale, with layers of grey bituminous limestone..	0	10
	87. Gray ironstone.....	0	3
	88. Greenish-grey, finely laminated, argillaceous shale.....	1	0
	89. Dark, fine, bituminous shale, with shells.....	0	9
	90. Greenish argillaceous shale.....	1	3
	91. Ironstone.....	1	0
	92. Argillaceous shale, with ironstone nodules.....	5	0
	93. Arenaceous shale and sandstone, with layers of argillaceous shale.....	4	6
	94. Layers of dark and light argillaceous shale.....	2	3
	95. Ironstone of variable thickness.....	0	9
	96. Greenish and bluish-grey argillaceous shale and sandstone in alternate layers, with a few ironstone nodules.	27	9
	97. Coal and coaly shale.....	1	3
	98. Finely laminated, coaly shale, with lenticular patches of the root-bed, No. 99.....	1	3
	99. Light-grey coherent underclay, meshed with rootlets...	1	0
	100. Bluish-grey argillaceous shale, with a dark streak at the bottom.....	1	6
	101. Light-grey coherent underclay, with a few ironstone nodules.....	2	8
	102. Alternations of light-grey rusty-weathering sandstone and argillaceous shale, with ironstone nodules.....	35	9
	103. Greenish argillaceous shale, with a coal streak.....	1	0

FEET.	INCHES.		FEET.	INCHES.	
6	0				
0	6				
11	0	104. Greenish-grey sandstone, sometimes mixed with shale.	9	0	
0	3	105. Greenish-grey argillaceous shale, full of rootlets.....	2	3	Lenticular seam of coal.
0	4	106. Light-grey sandstone. At one place a seam of coal is lenticularly formed at the expense of this bed, and the section is:—			
2	4	Argillaceous shale, with ironstone balls . . 1 3. . }			
0	1	Coaly shale 0 9. . }	5	0	
1	6	Coal 3 0. . }			
0	5	107. Alternations of dark shales and underclay, with large <i>Stigmaria</i> converted into ironstone			
2	0				
0	3				
2	10	108. Dark shale	7	0	
0	1	109. Coal	1	6	
4	0	110. Measures concealed. Probably black shale and underclay	2	0	
1	5				
0	2	111. Carbonaceous shale, 0 6. Coal, 0 6.	3	6	
		112. Rusty, indurated mixture of coal and gypsum	1	0	
4	0	113. Coal and <i>Cordaites</i> shale	1	0	Coal and gypsum mixed.
0	6	114. Greenish and bluish argillaceous shale, with impure coaly layers and nodules of ironstone; passes upward into underclay	2	6	
1	4				
		115. Impure coal or black <i>Cordaites</i> shale	6	0	
1	1	116. Dark bluish-grey coaly shale; <i>Cordaites</i> . Passes in places into coal	0	8	
0	2				
0	10	117. Underclay, very rusty, particularly on top	1	3	
0	3	118. Light-grey and rusty sandstone and arenaceous shale, veined with calcspar and containing a few ferruginous nodules	3	0	
1	0				
0	9	119. Dark shale, full of ironstone nodules and with streaks of coal	9	6	
1	3				
1	0	120. Concealed. Grey clay-rock with streaks of coal	7	9	
5	0	Below this is an irregular mixture of Lower Carboniferous and Coal Measures, as follows:—	18	0	Irregular mixture of rocks at the fault.
4	6	121. Gypsum; irregular	3	0	
2	3	122. Dark-grey clay	1	0	
0	9	123. Coal, veined with fibrous, crystalline gypsum between the bedding and cleavage planes	2	0	
27	9	124. Gypsum	0	1	
1	3	125. Underclay with trunks of trees mineralized with coal and gypsum in concentric layers	3	3	
1	3	126. Gypsum, full of crystals of selenite and gypseous marl	6	0	
1	0	Exactly how the foregoing beds at this fault are related it is difficult to determine, owing to the steep and broken nature of the cliff in which they occur, which is situated half a mile north of Beaton Point.			
1	6				
2	8				
35	9	127. Intrusive rock, generally compact and felspathic; green, black and purplish; also finely brecciated. Breaks into minute splinters or dice-shaped fragments	4	0	Dykes.
1	0				

	FEET.	INCHES.
Basal conglomerate.	128.	
	Conglomerate, probably of great thickness, extends in cliffs to the mouth of Mabou Harbor, overlaid in places by patches of gypsum and marl. Sometimes it is cut by dykes of dark greenish, rusty-weathering, crumbling diorite, varying in thickness from ten feet to a few inches, and some of the pebbles are traversed by veins of calcite. The alteration of the conglomerate by these dykes seldom extends more than a few inches, or at most a couple of feet. Dip generally eastward	
	1173	4

SECTION OF THE MEASURES FROM COAL MINE POINT NORTHWARD.

	1.	Light-grey sandstone, No. 1 of foregoing section	125	0
	2.	Underclay, with a thin layer of coal	2	0
	3.	Coaly shale	0	5
	4.	Underclay	0	6
	5.	Alternations of black shale and clay, with ironstone nodules	3	8
	6.	Light-grey sandstone, with plants	1	0
	7.	Greenish, argillaceous shale and clay, with black streaks and ironstone nodules	6	0
	8.	Coal and coaly shale	1	4
		In the bank some of the foregoing beds are replaced by sandstone, and seem to run into the thick sandstone. Or, in other words, the sandstone (No. 1) appears to rest upon the upturned edges of the shales.		
	9.	Argillaceous shale with black streaks	7	0
	10.	Dark coaly shale	1	6
	11.	Underclay and argillaceous shale, with coaly bands and ironstone nodules. Becomes sandy at bottom	8	0
Small fault.	12.	Measures concealed. Probably red and greenish gypsaceous marl. A throw of six feet seen high in the bank.	18	0
	13.	Sandstone	4	0
	14.	Measures concealed	16	0
	15.	Argillaceous rocks in thin and thick beds; ironstone nodules. Passes into fine arenaceous shale	18	0
	16.	Grey fine sandstone in several layers	7	0
	17.	Argillaceous shale with bands and nodules of ironstone	8	0
	18.	Coal and coaly shale	1	6
	19.	Underclay, with nodules and layers of ironstone	4	6
	20.	Light-grey rusty-weathering sandstone	3	6
	21.	Underclay and argillaceous shale, with ironstone nodules and coal streaks	8	6
Plants.	22.	Grey flaggy sandstone, with a thin bed of argillaceous shale, with ironstone nodules. <i>Corduites</i> and <i>Calamites</i>	5	3

FEET. INCHES.

	FEET.	INCHES.	
23. Grey and blackish shale; ironstone nodules.....	8	0	
24. Coaly band	1	6	
25. Dark shale.....	3	6	
26. Flaggy rusty sandstone.....	4	0	
27. Measures concealed.....	13	0	
28. Grey, rusty-weathering, fine sandstone, full of broken plants and concretions	13	0	
29. Dark bluish-grey argillaceous shale, with ironstone nodules and variable bands of coaly shale and underclay.....	8	0	
30. Whitish-grey, very fine, argillaceous sandstone, full of broken plants.....	3	0	
31. Sandstone like the foregoing, with a lenticular band of argillaceous shale containing ironstone nodules	1	0	
32. Argillaceous shale with ironstone layers and nodules, contorted.....	20	0	
33. Coaly shale and cannel coal. Greatly contorted and slickensided.....	5	6	Cannel coal.
34. Greenish argillaceous shale, with ironstone nodules.....	7	0	
A fault intervenes, running about S. 27° E. Then, on top of the bank, is a coal seam.			Fault.
35. Coal and coaly shale.....	9	0	
36. Underclay and argillaceous shale; ironstone nodules and irregular masses of coaly shale.....	10	0	
37. Coaly shale, passing into coal	4	0	
38. Underclay	8	0	
39. Shaly sandstone.....	2	0	
40. Wrinkled calcareo-bituminous shale, full of <i>Nauidites</i> , <i>Cythere</i> , etc.....	3	6	Bituminous shale.
41. Underclay	4	0	
42. Bluish-grey argillaceous shale, with plants.....	6	0	
43. Argillaceous shale, crumbling into clay.....	1	0	
44. Measures concealed.....	1	6	
45. Light-grey, rusty-weathering, massive, fine sandstone. Dip apparently N. 48° W. < 57°.....	26	0	
46. Greenish argillaceous shale, with a 6-inch band of coaly shale halfway. Perhaps a fault intervenes between the sandstone and shale, or between the shale or gypsum, or both. The dip is assumed to be the same as in 45, but is very doubtful	47	0	Faults
CARBONIFEROUS LIMESTONE			
47. Gypsum, dipping about S. 42° W. at a low angle. Of considerable but undetermined thickness.....	..	..
48. Grey marl with great masses of limestone; cream-colored marl with limestone bands, and conglomerate irregularly mixed with limestone and marl, occupy the shore from Coal Mine Point to Finlay Point, where the thick gypsum is again overlaid by coal measures.....	..	..
Total thickness	460	2	

The coal measures of the basin at Finlay Point (The Island) present no great thickness, being cut off on the west by the sea and on the east by the gypsum mentioned above. The following descending section will serve to show the character of the strata:—

SECTION OF MEASURES ON THE SOUTH SIDE OF FINLAY POINT.

		FEET.	INCHES.
	1. Grey, rusty-weathering, massive sandstone, containing plants, films of coal and cannel. The dip is variable, turning round about 90° in a distance of five chains. On the south side of the head, however, it is less irregular, varying only from N. 4° to 22° W. < 45°-19°. Thickness probably	340	0
Cannel coal.	2. Cannel coal, 0 2. Light-grey sandstone, 0 3. Coal, 2 1. Carbonaceous shale, 0 2.	2	8
	3. Underclay	3	6
	4. Light-grey sandstone, in thin and thick beds; rusty streaks and irregular masses of light bluish-grey argillaceous shale, calcareous shale and patches of greenish-grey fine conglomerate. Dip N. 22° W. < 28°. Streaks of carbonaceous shale and coal	47	0
	5. Measures in part concealed, but probably rusty sandstone	34	0
	6. Dirty, shaly coal	2	0
	7. Measures concealed	21	0
	8. Rusty sandstone; <i>Calamites</i> ; five streaks of cannel	6	0
	9. Coaly shale and coal	9	0
	10. Underclay	2	3
	11. Light-grey shaly sandstone	4	0
	12. Light bluish-grey argillaceous shale, with ironstone nodules	3	0
	13. Light greenish-grey shale and sandstone	3	3
	14. Coal and carbonaceous shale	2	1
	15. Yellowish underclay	2	3
	16. Coherent, rusty sandstone	6	0
Limestone.	17. Nodular limestone, 0 6 to 1 6. Dip N. 25° W. < 40°	1	0
	18. Argillaceous shale	0	3
	19. Carbonaceous shale	0	2
	20. Bluish-grey nodular limestone in thick and thin beds	6	0
	21. Light bluish-grey argillaceous shale	1	3
	22. Light-grey sandstone	1	2
	23. Light bluish-grey argillaceous and arenaceous shales and flags	14	6
	24. Dark-grey, friable, argillaceous shale, with ironstone nodules	7	0
	25. Reddish and rusty concretionary shale, with irregular bands of nodular limestone	9	0
	26. Light greenish-grey arenaceous and argillaceous shale ..	6	0
Fault.	Here occurs a fault.		

CARBONIFEROUS LIMESTONE.

	FEET.	INCHES.
27. Measures concealed.....	8	0
28. Indian-red marl and greenish-grey fine conglomerate in alternate patches.....	15	0
29. Similar to 28, but not all well seen.....	61	0
30. White and mottled, pink and green gypsum with crystals of selenite. The thickness generally assumes that the dip remains the same.....	154	0
31. Measures concealed at the mouth of the millbrook .....	..	..
Total thickness.....	772	4

On the north side of Finlay Point a similar section shows coal ^{Faults.} measures brought by a fault against gypsum and associated rocks, which are, in turn, underlaid by the quartzite already mentioned; while at the extreme northeast end of the basin, they come against Pre-Cambrian felsites. On the beach, none of the thick gypsum is met with, although in McPhee's fields above, it is well developed. The felsite cliffs are first capped with grey marl and conglomerate, then limestone and limestone-breccia appear, dipping nearly vertically N. 42° W. Further south, calcareous, greenish shales and concretionary limestone come against the felsite, dipping S. 68° E. at a high angle as above. Along the line of contact is a large quantity of heavy-spar. ^{Barytes.} Near this contact also is a limestone-breccia like that on the beach, but it is high up in the cliff, and is probably overlaid by the greenish shales. This is followed by an interval, obscurely seen, in which greenish-grey shale, dipping to the northeastward, appears to overlie a thick grey sandstone, which forms a long point. At the southeast side of this point the sandstone dips N. 35° E. < 43°; but turns immediately to N. 3° W. < 22°, and on the opposite or west side dips N. 15° W. < 23°. It contains carbonized trunks of trees, patches of coal and coaly shale, occupies a breadth of 14 chains and has a probable thickness of 350 feet, perhaps representing No. 1 of the above sections. It is underlaid by greenish argillaceous shale 14 feet, coal 2 inches, underlay passing into rusty sandstone 14 feet. ^{Coal.}

These rocks occur just below the house of Mr. Archibald McDonald (Miller). There is then a fault along which the sandstone is turned on end in a direction N. 63° E. The succeeding rocks are greatly ^{Faults.} jumbled and may be either above or below the thick sandstone, and the order of their occurrence is somewhat obscure. They comprise;—

	FEET.	INCHES.
1. Indian-red marl.....	..	..
2. Indian-red friable conglomerate.....	1	0
3. Measures concealed.....	15	7

land) present
a and on the
g descending

POINT.

FEET. INCHES.

340 0

2 8
3 6

47 0

34 0

2 0

21 0

6 0

9 0

2 3

4 0

3 0

3 3

2 1

2 3

6 0

1 0

0 3

0 2

6 0

1 3

1 2

14 6

7 0

9 0

6 0

	FEET.	INCHES.
4. Yellowish-grey, coarse, friable, shaly sandstone	3	0
5. Loose sand.....	0	3
6. Indian-red, friable marl.....	21	0
7. Indian-red conglomerate. Pebbles of felsite, syenite, jasper, etc.....	2	6
8. Red marl.....	1	0
9. Measures concealed—55 feet along the shore.....	..	..
10. Mottled, grey, red and yellow marl.....	3	0
11. Measures concealed for a distance of 15 feet along the shore .....	..	..
12. Dark bluish-grey, thin-bedded, calcareo-bituminous shale; fish-scales, teeth, coprolites and spines, <i>Cythere</i> , <i>Naiadites</i> , <i>Spirorbis</i>	2	0
Black shales. 13. Dark bluish-grey, flaggy, concretionary, calcareous rock, with the same fossils.....	2	6
14. Light bluish-grey, papery, friable, argillaceous shale, slightly bituminous and fossiliferous	1	10
15. Dark bluish-grey and black, bituminous, thin and thick- bedded shales; in places almost wholly composed of scales, teeth and shells. Sharp folds occurs in these beds	7	0
16. Dark calcareo-bituminous, fossiliferous shale. Very much contorted.....	3	10
17. Dark calcareous, fossiliferous flags, seamed with calcite ..	5	2
18. Argillaceous and arenaceous calcareous shales, papery, fossiliferous and very much contorted	2	6
19. Calcareous, contorted, fossiliferous, bituminous shales and flags; lenticular masses of soft, black, friable, argillaceous shale.....	10	0
20. Dark, soft, friable argillaceous shale.....	0	6
21. Like 19.....	9	0
22. Like 20.....	1	3
23. Dark bluish-grey, shaly, bituminous limestone.....	0	9
24. Like 20.....	0	8
25. Calcareo-arenaceous shale.....	0	6
26. Like 20.....	2	0
27. Calcareo-arenaceous, fossiliferous flags.....	0	7
28. Light bluish-grey, friable argillaceous shale.....	3	6
29. Light bluish-grey, arenaceous and argillaceous shales and flags, calcareous and fossiliferous. Dip N. 7° E. < 36°.....	3	6
Limestone. 30. Light bluish-grey, flaggy, arenaceous, bituminous lime- stone; fossils.....	5	0
31. Dark, soft, carbonaceous shale.....	0	3
32. Rusty-yellow and light bluish-grey or underclay	4	0
33. Rusty decomposed conglomerate	1	6
34. Yellowish clay, containing, as do also the shales, numer- ous simple and twin crystals of selenite.....	2	3
35. Light indian-red or chocolate-brown, soft, conglomeritic marl.....	1	0

FEET.	INCHES.
3	0
0	3
21	0
1	6
1	0
..	..
3	0
..	..
2	0
2	6
1	10
7	0
3	10
5	2
2	6
10	0
0	6
9	0
1	3
0	9
0	3
0	6
2	0
0	7
3	6
3	6
5	0
0	3
4	0
1	6
2	3
1	0

	FEET.	INCHES.
36. Light bluish-grey and rusty-yellow, gypseous marl.....	1	6
37. Like 35. The following section is plain and in descending order.....	1	0
38. Light bluish-grey, friable, argillaceous shalo.....	4	0
39. Measures concealed. Probably argillaceous shale.....	8	0
40. Indian-red and grey, fine-grained, broken, jointed sandstone passing into 41.....	7	0
41. Indian-red coarse sandstone, grit and conglomerate. Dip obscure.....	31	6
42. Measures concealed.....	32	0
43. Light bluish-grey, flaggy, bituminous limestone.....	0	6
44. Measures concealed. Probably bluish-grey marl.....	21	0
45. Gypsum, white with spots of orange, pink and green; crystals and veins of selenite. If the dip is N. < 45°, like the conglomerate, the thickness is.....	21	0
46. Measures concealed.....	58	0
47. White gypsum.....	5	6
48. Measures concealed.....	116	0
49. Light bluish-grey, shaly, arenaceous, bituminous, fossiliferous limestone, veined with calc spar.....	4	6
50. Indian-red hematitic conglomerate.....	6	0
51. Measures concealed.....	28	0
52. Indian-red conglomerate, darker than the last.....	12	0
53. Quartzite forming a cliff 20 feet high (described p. 374)..	..	..

It must be remembered that the above section is not supposed to be continuous, but is intended merely to represent the beds as they appear on the shore. From 1 to 11 the beds are probably Carboniferous limestone; and again at 45 this formation appears, while the whole section may be beneath the coal measures. The black shales are those from which an interesting collection of fossils was made by Mr. Foord, of the Geological Survey, in the summer of 1881. In this collection the following forms have been determined by Mr. Whiteaves:

Fossils collected by Mr. Foord

Naiadites (Anthracoptera) carbonaria, Dawson.

" (*Anthracomya*) *elongata*, Dawson.

Entomostraca.

Rhizodus lancifer, Newberry (scales).

Cælacanthus (jugular plates).

Scales of two genera of ganoid fishes.

Also jaws and teeth of fishes undetermined.

Broad Cove Coal Measures.—A narrow fringo of grey sandstone skirts the coast from Port Ban to Cheticamp, forming a shallow syncline, the western side of which is only occasionally present. It is underlaid by the limestone formation, and at several points contains workable seams of coal. Considerable ambiguity exists concerning

the limits of these rocks, so that the boundary lines on the map are only approximate. No section has yet been made owing to the imperfect exposure of the measures; but the strata will be described as they occur in different places.

Port Ban.

At Port Ban, grey fine sandstone caps cliffs of banded Pre-Carabrian felsite and extends as far as the road. From this point the shore for a great distance is approximately on the strike and is occupied by coarse and fine, grey sandstone, with bands of argillaceous shale. The dip, which is seaward, seldom exceeds 10° and the thickness probably is not less than 450 feet. About half a mile west of McIsaac Pond the sandstone is overlaid by a coal seam or group of seams. The seam varies in thickness where seen in the cliffs from 2 feet to 2 feet 6 inches, but in the workings is said by Mr. Robb to be 3 feet 2 inches of bright cubical coal, with a parting 6 inches from the top. Above the coal come 10 feet of dark-greenish argillaceous shale, overlaid by sandstone 12 feet, till the measures are concealed by the sandbeach at

McIsaac Pond

Broad Cove River.

In Broad Cove River, below the bridge at the sandstone quarry grey, nearly horizontal sandstone is found in thick beds, with argillaceous shale and coal seams. One of these seams occurs on the top of a cliff on the left bank, about 100 feet above the sea, where the following descending section was measured in 1873 by Mr. Robb:

	FEET.	INCHES.
1. Greenish fine sandstone.....	3	0
2. Red and green marl.....	17	0
3. Massive sandstone, reddish on the outside, but streaked-yellow and green within.....	20	0
4. Bluish-grey argillaceous shale.....	7	0
5. Coal, with a thin clay parting in the middle, said to be good gas coal.....	3	0
6. Underclay, containing <i>Stigmara</i> , silicified with black and grey rock, covered with minute crystals of quartz....	..	..

This coal has been worked by pits near the water level, lower down on the right bank. Here the section is said by Mr. Robb to be:

	FEET.	INCHES.
1. Coal.....	0	11
2. Clay.....	1	0
3. Coal.....	3	9
4. Underclay.....	4	0
5. Greenish-grey fine sandstone, with hard close-grained whitish sandstone in cliffs which extend some distance down the river.....	..	..

Other details concerning the field are given by Mr. Robb in the Report for 1873-74, p. 182.

A quarter of a mile north of the mine, at a tunnel near the tramway, is a coal seam, of which $4\frac{1}{2}$ or 5 feet has been worked, this being underlain by clay and more coal. It is supposed to be the 14 feet seam.

In the brook north of Broad Cove River another opening has been made in a seam of coal, associated with argillaceous shale and sandstone, dipping steeply S. 70° W. down stream. In a drift on the seam the strike is N. 18° E. The section is:

	FEET.	INCHES.	
1. Underclay .....	..	..
2. Coal.....	1	6	14-foot seam.
3. Coal worked	4	8	
4. Coal and coaly shale.....	3	0	
5. Clay	0	9	
6. Coal and coaly shale.....	1	9	
	<u>11</u>	<u>8</u>	

But as this is known as the 14-foot seam; the under-clay (1) is probably overlaid by more coal. Above the bridge at which the seam is worked, another, said to be 5 feet thick, has been opened; above which the brook displays greenish-grey, coarse and fine sandstone.

The pits are too far apart for any satisfactory attempt to correlate them, a task which must be left till further development of the area has taken place. To the north and east the coal measures are interrupted by the Carboniferous limestone, but in some places at least the overlap is complicated by faults, the exact position and amount of which is obscure.

In Brown's Coalfields of Cape Breton, p. 39, and in the report made by Professor Hind in 1873, the sequence of the seams is given as follows:

Succession of seams as given by Professor Hind and Mr. Brown.

LOWER GROUP.

	FEET.	INCHES.
Coal	2	6
Strata underlying.....	60	0
Coal—thickness unknown.....	..	..

UPPER GROUP.

Coal, the highest bed.....	3	0
Strata.....	340	0
Coal	5	0
Strata.....	100	0
Coal, main seam.....	7	0
Strata.....	240	0
Coal	3	6
Total thickness of upper group	<u>698</u>	<u>6</u>

About Strathlorne no rocks are seen, but the country is covered by sand similar to that derived from the sandstone on the shore, so that it

is not impossible that a tongue of the coal measures may extend in this direction. In confirmation of this supposition Mr. Isaac McLeod states that in digging into the bank at the post office, coal wash was found.

Broad Cove
Marsh.

Chimney Corner Coal Measures.—North of Marsh Point is a still more indefinite basin, containing the lowest beds of the coal measures and some seams of coal.

Black bituminous shale.

The Marsh Brook, below the post road, passes over reddish fine sandstone which has been quarried. Lower down are reefs of grey, fine, ripple-marked sandstone and dark argillaceous shale, followed by bright-red marl; and at the mouth, grey and rusty sandstone contains plants. On the shore, between this brook and the next, and for a considerable distance north-eastward, black, argillaceous, shelly, calcareo-bituminous shale, occasionally passing into coal, is accompanied by bands of red and greenish shale, with ironstone nodules; and grey, fine, broken, micaceous, argillaceous sandstone, rusty on the surface, passing into fine grit and containing broken, carbonized plants; but the absence of grey shale and fern beds here as well as in other parts of the Inverness coalfield is remarkable.

Coal wrought
at McLeod
Brook.

There is an interval of a mile and a-half, which extends quarter of a-mile past the mouth of McLeod Brook, concealed by a sandy beach and low banks of red drift; but a short distance inland, on the farm of Alexander McLeod, a seam of coal, said to be three feet thick, has been worked. In a brook about a mile to the eastward is a seam, also said to be three feet. In some of the brooks of this neighborhood, above the road, grey and rusty sandstone is met with, and, in that just mentioned, forms stony, strawberry-barrens. To the north-

Anticlinal fold.

ward, an anticlinal brings the lower Carboniferous rocks on the shore. At the contact, a thick grey and rusty sandstone is on top of the cliff, while beneath it are grey flaggy sandstone and bituminous shales full of shells, which with gypsum and purple, red and greenish marl containing calcareous nodules, come with a different dip from beneath the sandstone at several points before the coal measures take the shore at the mouth of the School Brook, and occupy it as far as Chimney Corner. At the mines the thickness of the coal measures is considerably greater or the basin deeper, several seams of coal and a great thickness of associated strata being exposed, and it is also probable that the unconformity is complicated by faults. Professor Hind gives the section at the coal mines as follows in descending order, the dip being north-westerly at an angle of 40° :—

Professor
Hind's section.

	FEET.	INCHES.
1. Thin seams.....	1	6
2. Strata, about.....	300	0
3. Coal.....	3	0
4. Strata.....	88	0
5. Coal—main seam.....	5	0
6. Strata.....	200	0
7. Coal.....	3	6
Total thickness.....	601	0

The strata immediately above No. 3 at Chimney Corner Point are as follows:—

	FEET.	INCHES.
1. Heavy-bedded, grey and rusty sandstone.....	..	..
2. Grey and bluish-grey argillaceous shalo.....	10	0
3. Black shale.....	10	0
4. Greenish argillaceous shale.....	6	0
5. Grey sandstone.....	6	0
6. Coal, No. 3, said to be a good steam coal, worked by Wilson.....	3	0
	35	0

North of the cove at the mine, grey sandstone, dipping about N. 80° W. <53°, is underlaid by greenish and reddish marl with bands of whitish sandstone, which is in turn underlaid by grey sandstone and bluish-grey crumbling argillaceous shale, containing a few shells, and passing into a wrinkled, calcareo-bituminous shale full of shells. The strata concealed in the cove would appear to be about 685 feet; the underlying sandstone, etc., 395 feet; underlaid by dark shale with basins of underclay, and two 18-inch bands of sandstone at the bottom underlaid again by a small seam of coal of undetermined thickness and by an underclay. Below these rocks dark shales again appear in and near the small cove at the mouth of the next brook, showing a thickness of about 580 feet, below which is a grey sandstone with a few bands of bluish argillaceous shale. The sandstone contains trunks of trees carbonized and silicified, runs along the shore for about two miles, is probably 300 feet thick, and is underlaid at Whale Cove by three feet of coaly shale with an underclay, succeeded again by grey sandstone 100 feet underlaid by a small seam of coal, one foot of which is visible. The strata are then concealed by Whale Cove for about 425 feet, beyond which a great thickness of grey sandstone, with a few bands of greenish and bluish-grey shale occupies the coast to the mouth of Margaree Harbor. On Grey Point, and at the breakwater, are cliffs and reefs of grey, rusty and fine crumbly sandstone. In the brook east of the limekiln at Whale Cove, and in other brooks of the

Strata between Chimney Corner and Margaree Harbor.

Whale Cove.

vices, this sandstone occurs to the top of the hill, associated in both branches of the large millbrook, with thin beds of argillaceous shale.

Margaree
Island.

The strata of Margaree or Sea Wolf Island consist of grey and rusty sandstone with a little shale dipping northwestward at a low angle. The soil is very sandy, and supports no vegetation for some distance from the cliffs.

Rocks between
Margaree and
Cheticamp.

On the shore opposite the school house, two miles north of Margaree Harbor, is a sandstone, like that of Margaree Island, covered with broken, carbonized plants, and enclosing bands of argillaceous shale. Between the road and the shore the land is wet and barren, being probably underlaid by this sandstone, which runs in reefs parallel to the coast line, dipping steeply seaward. Above the road is a belt of low land perhaps underlaid by Carboniferous limestone, beyond which are the waving outlines of the steep hills of conglomerate. At the mouth of the brook near Anthony D. White's, and immediately south of it, red argillaceous shale, probably belonging to the Carboniferous limestone, is in place, and at the head of the next cove, red shale and gypsum are present. About a mile north of the school mentioned above, at the mouth of a large brook, red rocks dip seaward at an angle of 65° , but are succeeded further north by the light-grey, coarse sandstone of Friar Point, associated with reddish-grey argillaceous sandstone and shale. Near the lobster-factory bluish-grey sandstone, with broken, carbonized plants, is associated with drab marl and sandstone.

Cheticamp.

Near the lighthouse on Cheticamp Point, these rocks dip S. 25° E. $< 15^\circ$. On the outer shore they are well exposed, but the shores of Eastern Harbor are low, and display few outcrops. Such exposures as occur, however, seem to prove that the island forms the axis of a narrow synclinal fold of these measures, which run nearly to Caveau Point.

SURFACE GEOLOGY.

Superficial deposits, properly so called, are as scarce in the region to which this report refers as in that described in the report for 1879-80, being confined principally to the seashore and to the intervals of those large rivers which flow through Carboniferous districts, the soil and surface in most cases being derived from the waste of the underlying rocks. Banks of sand and gravel do indeed appear even in brooks flowing in Pre-Cambrian areas, but their occurrence is unusual, the river beds being generally too narrow to admit of the lodgment of detritus. Dauphiney Brook, a branch of Clyburn Brook, is remarkable for the size of the valley cut by so small a stream and the large quantity of gravel. It probably empties the lake lying to the north-

westward, the head of which was crossed by a traverse from Dundas-Brook. Power Brook also exhibits the phenomenon of a wide valley filled with drift. The lower part of Clyburn Brook is enclosed on both sides by steep, bald hills of syenite.

Ice grooves are seen in several parts of the region. Around Lake Law they run parallel with the valley, which has a northerly trend. (Glacial striae.)

The most marked feature in the landscape is the hills, the general arrangement and character of which have been already sketched. They for the most part occur in ridges or groups, but also in isolated mountains, such as the highlands of Cape Mabou, Wilkie's Sugarloaf and the Sugarloaf of Northeast Margaree. On top, these hills are comparatively level for a variable width. When narrow, as on the Skye Mountain, the land is dry and cultivable; but wherever it is so broad that the water has a chance to accumulate in marshes and there is no timber, "barrens" are found. These barrens are everywhere alike, but some of the principal ones may be enumerated. At the head of the McLeod branch of Middle River, mossy fern and spruceland borders the marshes in the brook, which flows here in a bed of sand composed of syenite and quartz. A considerable distance between this and the Fourth Gold Brook is occupied by a barren, covered with a layer of white moss, lichens, equisetu, indian-tea and other plants at least one foot in thickness, but no trees except scraggy red spruce, seldom more than ten feet high, although some dead poles attain a height of twenty feet. On the summit between the two brooks even these trees disappear, leaving bushes and a bare surface of grey and white and brownish moss, lichens and grass, dotted with the bright colors of the golden-rod and a small purple star-flower, followed by dry land underlain by syenite and covered with blueberries. Except for the small mounds of syenite here and there and a few cradle-hills and clumps of spruce and alders, the surface for a great distance northeast and southwest is uniform and bare. Scraggy spruce again indicates another descent into better timber with little pools of water and lake-apples (*Rubus Chamemorus*), and birch and spruce, the steep slope of a branch of the Fourth Gold Brook. (Distribution of the hills.)

At the head of Mount Pleasant Brook, scrubby, white spruce occurs on a barren intersected by cariboo runs and interspersed with grass and moss-marshes. Near Pine Brook is a large barren with a few hazel bushes, ferns, mountain ash, spruce and blueberries, covered with blocks of syenite and in part dry, mossy and stony. (Barrens of Mt. Pleasant and Pine Brooks.)

The watershed at the source of the Northeast Margaree and adjoining rivers, is occupied by large barrens mossy and treeless, with berries. (Northeast Margaree.) Masses of the usual crumbling syenite crop out in small

knolls over the surface and in certain spots the vegetation has been removed by cariboo in spring in search of food. Droppings and tracks of the cariboo, bear, rabbit and moose are found everywhere; on the wet barrens are a few snipe and plover, and loons visit the small ponds. There is no great depth of soil on these barrens. Sluggish streams flow through them in shallow alder-valleys and marshes, bordered with spruce, ferns and mountain ash, the bark of the latter being used by the moose for food: they are for the most part straight in their course, but sometimes very tortuous, and without feeders from either side; now winding through small marshy tracts, now through scrubby, wiry spruceland, and again through taller spruce and scattered birches. The east branch of the Northeast Margaree ends in two small brooks, the most northerly emptying a pond ten by twenty feet, the other coming down a glade two hundred and fifty yards long with a string of small trout ponds at the top. All the land between the head of the Ingonish waters and the Margaree main camp is absolutely worthless except for bakeapples, blueberries and peat.

Cariboo, moose, etc.

Birds.

Trout.

Peat.

St. Ann's barrens.

Burnt barrens.

Ingonish and Cheticamp.

Southwest Mabou.

At the head of one of the branches of the North River of St. Ann's is a large hay-marsh which passes into a barren covered with yellow moss and a short bright yellow grass, containing only a few clumps of wiry, twisted spruce bushes, three feet high. A belt of alders indicates where the brooks follow the edge of the barren which is also surrounded by spruce of the ordinary character.

Between Green Cove and the road, the country is barren, having been swept, some years ago, by a forest fire which also destroyed the fishing station. In this barren the rounded knolls of red granite and syenite rise conspicuously. Unlike other parts of the shore this is comparatively level and in most parts accessible. The road to Green Cove is a mere footpath but not hard to follow.

Fine blueberry and huckleberry barrens occupy a great part of the road from Ingonish to Aspy Bay, the road being dry and hard although stony. On the barrens near the head of Cheticamp River, *Myrica cerifera* abounds with white, red and black spruce, but no birch.

Barrens are found in the Carboniferous district north of Buddeck and elsewhere, but, in such cases, owe their existence to fires. At the Garry, large plains like those of the Big Brook and Northeast Egypt are underlaid by gypsum, and the road to Warren Lake also passes through similar barrens. Patches of barren or half-barren clayland occur among the Carboniferous rocks about Port Hood and Southwest Mabou, much of which can be reclaimed. At the head of Skye and Brook Village Rivers, which rise in the same valley, similar barrens are accompanied by fine hay-marshes.

The number and diversity of the rivers and brooks * of the region is remarkable, and some of the more important points concerning them may be mentioned. In the southern and well settled portions of the country they resemble those described in the Report for 1879-80, the shorter ones being steep and rapid, the longer more sluggish and often in intervale. In Galant River intervale alternate with narrow ravines formed by bands of grit, the latter being wooded with small spruce, the former with birch and maple. The ascent is remarkably even, and it is consequently a good timber brook. At its head are small stretches of marshy hay-land, but the country, although level, is not productive.

At the head of Glendyer Brook, Mabou, a large, dry brook-bed occurs in broken limestone land. It is paved with limestone blocks covered with a thin white deposit of chulk, passes through a fine hardwood valley, and is evidently used whenever there is too much water to pass down the subterranean passage, the water continuing thus for about a mile, it then emerges as a strong brook.

Intervales occur along the banks of the Black Brook north of Ingonish, and in some parts large pines and hardwood are met with. The river throughout its entire length has an even course, with no falls worthy of the name; and at the bridge there are no high hills in sight, the country having fallen gradually with the river. The land, as far as seen on either side, with the exception of the small patches of intervale, is as valueless as that near the bridge, supporting only raspberries, huckleberries, blueberries and foxberries. The river can be followed up to its source, and affords an easy entrance into the heart of the country, running back, as it does, for a distance of thirteen miles to the source of Cheticamp River. The moose hunters seem, from the fact of there being old camps on the headwaters, to be tolerably familiar with its upper stretches which are particularly easy to travel. All the water the river contains comes from marshes, ponds and barrens which well accounts for its dark appearance. The absence of large branches in the lower reaches, and the rapidity of rise in a rainstorm are features in the river.

In the North Aspy River as far as the fork of the Big Southwest Lake also barren clay- and South-land of Skye ey, similar

* Local usage has been followed in applying the terms "brook" and "river" to the large streams; this varies in different places, and has, therefore, as will be readily understood from the map, no definite relation to the comparative size.

- Trees. birch, maple, ash and beech—and soft wood—small pine, large hemlock, white and black spruce. There is land enough on the right bank of the river as far as it flows among Carboniferous conglomerate, to make farms, and from the large timber, supported by the felsite, the same might be said of it, although the slopes are too steep for cultivation. So remarkably straight is this river that one can obtain a lovely view down the valley to the sea from near its source, and a continuation of this straight line skirts the high hills of the promontory of Cape North. Above the Big Southwest Brook the bed is in places rough, but not steep. Near the source it rises in a succession of cascades, spruce and birch fringe the banks even where the small marshes occur. The water is from springs and very cold. The stones of some of the springs are covered with feathery moss, slimy weeds and delicate little trailing plants somewhat resembling chickweed (*Stellaria*), or *Linnea borealis*.
- Straight course of this river. The Mackenzie River is a very hard one to follow, the narrow bed being rough and without intervals, and the walls precipitous. Lumbering has been carried on for a short distance up, a few pines, seldom exceeding two feet in the butt, growing at the foot of the hills, the tops of which are clothed with small spruce. On August 17th, 1881, the following berries were ripe in its bed:—Straw, rasp, huckle, blue, fox (*Vitis Idæa*), pigeon, cran and serviceberries, red and black currants, but this lateness is no doubt in consequence of the depth of the valley and absence of the sun, because strawberries were ripe in the settlement of Northeast Margaree the same year about the middle of July.
- Mackenzie River. Pine. The Indian Brook of St. Ann's is rocky and inaccessible below the upper settlement, but the upper part is comparatively level spruce-land and mossy fern-land with a few birches, and in the McMillan branch hay and alder-marshes occur. Above the outlet of Gisborne Lake there is very little rise in the East Branch, which is bordered by hay-marshes; at its head alder-marshes, 150 yards wide, are succeeded by spruce-land. A wonderful profusion of Indian pears was found in this brook on Sept. 23rd, 1881, in the western branch, and two days later cherries were equally abundant, with high-bush cranberries, blueberries and pigeonberries, although on the barrens at the head of the river, these fruits were spoiled by frost on Sept. 16th, a week earlier.
- Berries. At the head of Cheticamp River barrens and marshes follow for several miles, as on the Indian and Ingonish Rivers, before it cuts into gorges. On all the gentle slopes tall spruce-poles occur. Where the Northeast Margaree River comes near the Cheticamp, the former is only a few feet below the level of the surrounding country, whereas the latter is in one of its wildest ravines. A short distance further down, however, the Northeast Margaree also cuts deeply into the land,
- Indian Brook of St. Ann's.
- Season of wild fruits.

but is nowhere so dangerous as the Cheticamp, although like all these rivers subject to floods which overflow the intervalles and destroy the bridges. Mr. Campbell states* that the water rises in the lower part of the Cheticamp River, where the channel is 150 feet wide, to as much as fifteen feet above its ordinary level, and the rise in the Indian Brook at times must be quite as great. ^{Freshet in the Cheticamp River.}

In the neighborhood of the Baddeck camp, the river flows in narrow ^{Baddeck River.} alder and hay-marshes, and the hills are timbered with hard-wood and spruce. At the head of John McDonald's Brook similar marshes are found with small ponds. Most of the timber on all the hills about St. Ann's and Baddeck has been blow down by gales, the eastern slopes having suffered most. Northeast from this camp there is little variety in the character of the country, which is covered with spruce, birch and mountain ash, and has a few not very steep slopes, often strewn with windfalls. Then comes an area of mossy marshes with scraggy spruce and alders, extending to the North River. The brook from the small lake in the neighborhood leads in a winding course through hay-marshes, to John McDonald's Brook. Southeast of the camp, for more than a mile, the country is comparatively level, with several small, marshy depressions; then a little brook begins from a narrow marsh, runs into lagoons and to the Baddeck lakes. These lakes are ^{Baddeck lakes.} famous for trout-fishing, and the shores are easily accessible, being laid with small flat pebbles or boulders, and none of the lagoons being difficult to get round.

The branch of the North River of St. Ann's, southeast of Peter's ^{North River of St. Ann's.} barren, flows in its upper part through level land and marshes. On a traverse southwest from the confluence of this with the main river the line for some distance ascends through spruce woods, blown down on top of the hill, and strikes the west branch among alder and grass-marshes. Below this point, the river runs comparatively level, nearly to the great falls, showing pretty sand beaches, alders and grass, the banks being always wooded. In the upper part of this branch and near Ranald's Brook, the country is covered with light timber, scraggy spruce, ferns, sarsaparilla, pigeon-berries, moss, white maple-bushes and alders. The land is of fair quality, not much elevated above the brooks which come from springs. In Ranald's Brook the banks are sometimes precipitous, at other times sloping, and wooded with birch, mountain ash, spruce and small white maple, some of the birches yielding large sheets of canoe-bark.

In all the rivers that pass through Carboniferous rocks, intervalles ^{Intervalles.} occur, of which the principal have been already mentioned. They are

* Goldfields of Nova Scotia, p. 10.

all remarkably productive. In some cases, however, as in the Southwest Margaree, the valley is narrow, and the cultivable meadow land consequently scarce. But although the river is here in a deep valley, the upland is good, and above the road is a line of sloping, well cultivated land, behind which lie steeper, often rugged, wooded hills.

Sea shore.

The sea shore is always high and rocky when occupied by Pre-Cambrian rocks, and even when formed by Carboniferous strata if these latter be sufficiently coherent to resist abrasion. On the Bras d'Or Lake the shores are as a rule low.

Sand beaches.

Long sand-beaches occur in many places, the principal of which are at Aspy Bay, St. Ann's, Broad Cove and Mabou. That at North Aspy Pond is three miles long, and is covered with small conical mounds of sand, a little coarse grass and a few other plants. A long sand beach occurs at the head of Cheticamp Harbor, and the country thereabout is sandy from the disintegration of the grey sandstone which forms the coast.

Want of harbors.

There are no good ship-harbors on the coast from the Strait of Canso round by Cape North to St. Ann's, the best being the open roadstead of Port Hood, Mabou Harbor, and the Eastern Harbor of Cheticamp. Attempts have been made to improve those of Mabou, Margaree and Ingonish with tolerable success considering the difficulty of the undertaking and the small sums of money granted by the Dominion Government for that purpose. It has also been proposed to cut through the beaches at McIsaac Pond and Aspy Bay. "McIsaac

McIsaac Pond.

Pond* covers an area of eighty-four acres, has a depth of water varying from ten to twenty-five feet, and is separated from the Gulf by a beach of coarse shingle, two and a-half feet above high water, resting upon a bed of mud and sandy subsoil. The water to within a few fathoms of the shore is deep, with excellent holding ground and the absence of rocks and shoals renders the approach easy and safe; so that it is only necessary to construct a breakwater-channel to render the pond a safe harbor of refuge in the vicinity of the most prolific fisheries of the Gulf of St. Lawrence, and afford facilities for shipping coal. A survey of the locality was made in 1878 by Walter M. Buck, C. E., who estimated the cost of opening the beach at \$19,347."

Aspy Harbor.

Inside the beach of the north pond of Aspy Bay, for a distance of two miles, there is a harbor with two and a-half to three fathoms of water, but at present the entrance is not permanent, the water breaking through in different places. Aspy Bay is said to be easily accessible for vessels, and not closed by ice in winter. The sand is not more

* Report of the Inverness Coal, Iron and Railway Co.

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than two feet deep, being underlaid by clay, and outside the beach the water deepens rapidly. The distance between the points of three fathoms deep outside and inside the bar will not much exceed 300 yards; and the holding ground is good, for there seems to be a deep substratum of stiff boulder clay into which piles can be driven to any depth that may be deemed necessary.*

TIMBER, CLIMATE, ETC.

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The trees, plants and animals mentioned in my last report are also to be found in the region further north; and incidental mention has already been made in the foregoing pages of the timber characterizing particular districts. The trees of the intervalles are large and good. Fine elms and oaks occur in the valleys of Cape North and Pleasant Bay. The slopes of the hills are also heavily wooded as well as the summits with lighter timber, except on the barrens already described. A few pines of considerable size occur in the brooks at Neil's Harbor and in Little River further south; but they are of no economic value. Here we should like to pay tribute to the exquisite beauty and great variety of the woodland flowers and to the flavor and abundance of the small wild fruits. ^{Trees.} ^{Wild flowers and fruits.}

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Oysters are found on the low gravelly flats about Portage Creek, St. Patrick's Channel, Whyecomagh Bay, and other parts of the Bras d'Or Lake; and heaps of clam shells on the shores of the lakes and creeks where some mink or muskrat has been feeding. Lobsters abound on the coast. Herring, cod, mackerel, halibut and other fish, are taken everywhere, and wherever there is a boat harbor it is thronged with huts. Trout are found in all the streams. In Lake Law trout and eels abound, and gaspereaux also are said to have ascended to the lakes before the construction of mill dams on the brook. In the first branch of the Indian Brook of St. Ann's, above the shore road, among the falls, numerous small eels four inches in length were seen. A wonderful trout-pool in which salmon are also occasionally taken, is that on the Lake Ainslie Trout Brook just below the bridge on the shore road. But for salmon fishing the Margaree River below the Forks and the Northeast Branch have the widest fame. The latter is fished for many miles above the settlement, there being no great falls; and trout are found in abundance at the very head. Among other excellent salmon streams are the Barasois River, the middle branch of the North River, the Indian Brook as far as the falls, and the Cheticamp River to the foot of the gorge. ^{Oysters.} ^{Fishes.} ^{Trout.} ^{Salmon.}

* Campbell's Gold Fields of Nova Scotia, page 11.

Cariboo and
moose.

Herds of cariboo roam over the barrens, on one of which, not far from Big Intervale, about a hundred and fifty were counted one day about the end of October, 1881. Moose, once numerous, are now seldom seen.

Scenery.

The scenery around Whycomagh, Little Narrows, Baddeck and Great Bras d'Or is not less charmingly picturesque and varied in feature than in other parts of the Bras d'Or Lake, but is surpassed in grandeur by St. Ann's, Ingonish and Cape North. The country inland about Brigend, Whycomagh, Lake Ainslie and the head of Southeast Mabou is like other conglomerate districts. Cape Mabou resembles the highlands elsewhere, and the glens are very beautiful besides being easy of access. The brook near McDonald's shop, Middle River, has a valley of singular beauty. The best known, however, is that of Lake

Lake Law.

Law, with its chain of deep, dark lakes, overshadowed by hills which are finely sculptured and, as it were, isolated by the brooks which form gulches between them. The black shadows thrown upon the surface of the lowest lake by these hills are particularly fine by moonlight, and many a study of lights and shadows is afforded in this vicinity. Another good view of these lakes is obtained from the upper end when first the traveller from Middle River comes in sight of them.

Margaree
River.

From the top of the barren between McRae and Pine Brooks there is a fine view of the valleys of Middle River and Margaree, the Bras d'Or Lake, Boisdale Hills and all the region towards the Gulf of St. Lawrence, the hill descending most precipitously on the Margaree side. A good view of the settlement of Northeast Margaree and the Sugarloaf can be obtained with much less fatigue from the road between John Miller's and John Coady's on the opposite side of the Big Brook. And in every part of the Margaree River the scenery is romantic, abounding in that variety of feature of mountains and glens and valleys in which the beauty of Cape Breton inland or river scenery consists, aided greatly by the sculpture of the hills, the alternation of patches of spruce and hardwood, of farms and woodland, gentle slopes and rugged precipices, and by the silvery threads of the brooks winding down from the hills in fine curves or falling over the cliffs after emerging, as it were, from the solid rocks on a steep face—an appearance due to a sharp turn in the brook which conceals the upper part from view. The haze which often hangs over these hills contributes greatly to their beauty by softening the outline, and through it the dull red sun makes rosy the few clouds floating through the prevailing blue. The dark blue or indigo of the distant hills, the cloudy green of those a little nearer and the bright green and sharply defined outline of those close at hand produce an effect of color that cannot be

described, but is well seen from the pass at the head of the pretty glen of Coolavee at the narrow belt of marsh-land from which brooks flow northeast and southwest. The scenery of the Big Intervale, and the two valleys separated by the Sugarloaf, is justly admired by everybody who has visited them. Big Intervale.

The shores display bold striking views wherever the Pre-Cambrian rocks are in place. The hill behind the Lake settlement of Cheticamp is rounded on top and appears like a huge dome, being separated from the adjoining hills by a pass and two glens, one running to the Farm Brook and the other to the Factory Brook. At the lake the country is cut into mounds and hollows by gypsum. In the Farm Brook is a very beautiful fall with a pool at the bottom and magnificent cliffs, and there are others in various parts of the country. The land along the shore from Cheticamp to Cape Ronce is very hilly, and great difficulties lie in the way of building a road to Pleasant Bay. A road could probably be made through the interior from Big Intervale across the head of the Rocky and Campbell's Brooks to Cape North settlement, crossing the Cheticamp River above Artemise Brook. A magnificent view of Pleasant Bay is obtained from the hills between that bay and Fishing Cove. Cheticamp.

About Cape North the scenery is very striking. The cliffs are massive, the glens pretty, and the sea shore wild. The short brooks are steep and rough, full of rapids and cascades and with small seraggy barrens at the head; the longer ones, like the rivers elsewhere. At Sparling's Brook, Mr. Zwicker some years ago erected buildings for curing salmon, at a cost of \$400 or \$500, all of which were swept away by the sea. Wilkie Brook runs for many miles in a level, wooded valley which the cattle follow. Cape North.

The Big Glen of Baddeck is very beautiful, and in the tributary of the Northeast Branch, which crosses the road a quarter of a mile south of this branch the hill on the north is a huge dome beside which the brook runs in a beautiful hardwood valley. The water is bright and cold, the stones covered with greenish-yellow moss, grass, etc. Diorite floors the brook, which is overarched with maple bushes. Baddeck glens.

St. Ann's is also noted for its bold and imposing scenery, which has been compared* to that of Mount Desert in Maine. A curious feature of the syenitic hills of the east side of St. Ann's Glen is the ridged and furrowed character of the surface, the hill being so narrow and high that the water instead of forming definite brooks comes down the slopes in hundreds of tiny brooklets. But grand as are the combinations of sea, land and sky—the high massive hills, gullied brooks, St. Ann's.

* Warner's Baddeck and That Sort of Thing.

Ingonish. stretches of sand, fields and wood, the ever moving sea and quiet ponds— which enter into the magnificent scenery of St. Ann's and the North Shore, they are well nigh forgotten within sight of the mountains of Ingonish. Two deep bays, separated by a narrow, picturesque, rocky promontory, opening upon the sea and nestling, as it were, among the mountains; these mountains, the highest in Nova Scotia, an imposing feature in the precipitous rise of their sculptured sides from the rivers which flow into the bays; outside the open sea, which gives evidence of its power by the huge boulders piled far above high tide upon the break-water; large brooks coming down, deep, gloomy and solitary valleys— "the mysterious entrance into far valleys in the unseen mountains behind"; life in the foreground, the huts of the fishermen on the shore, the vessels in the harbor, the white sails of the American fishing fleet here and there along the shore, gulls and ducks on the water, and beyond a lighthouse on an island. Although the road over Smoky Cape is steep, it is good, and on approaching the South Bay we obtain from the hill top a view of the sea and the bay below which fills us with delight. The sea, over-shadowed by the hills, the waves rolling on the beach and booming along the cliffs produce a pleasure not unmingled with terror.

Farm produce. The crops raised in northern Cape Breton are the same as those of the south. Apples, plums, cherries and other fruits are largely grown at Mabou, Lake Ainslie, Margaree and elsewhere. Oats, wheat, barley, buckwheat, hay and potatoes are the principal crops, and seldom fail to ripen.

Seasons. The season differs in the valleys and on the hills. Spring is sometimes very late owing to the quantity of drift ice on the shores. On June 7th, 1881, patches of snow were seen in some of the sheltered glens about Northeast Margaree, while at the same time there were banks of violets in the neighborhood. Two days later, may-flowers (*Epigaea repens*) were found on the hill between Cape Rouge and Fishing Cove. On the top of the hill between Pleasant Bay and Cape North on June 13th, there were three feet of snow, and two days later three feet and a-half on the road between Wilkie's Sugarloaf and Bay St. Lawrence. Bake-apples were in great abundance on Peter's barren on August 3rd. Wild cherries were ripe at Ingonish on September 11th, and blueberries and huckleberries about the same time. In many parts of Cape Breton there are said to have been eight feet of snow on the level in the winter of 1881-2, and twenty to thirty feet in the gulches. On June 6th, 1882, there was ice in Sydney Harbor and the steamer could not go round from the Bras d'Or Lake to Sydney. On the mountains, in the woods bordering the barrens of Margaree, snow was seen on June 23. But both of these seasons were

remarkably backward, and, notwithstanding their lateness, harvest does not seem to have been later than usual or less abundant.

In 1883, on the other hand, when the shores were free from drift ice all spring, root crops and a considerable quantity of grain had been put in the ground before April 20th.*

ECONOMIC MINERALS.

Coal.—The want of suitable harbors has hitherto retarded the development of the valuable seams of coal found on the Gulf shore at Port Hood, Mabou, Broad Cove and Chimney Corner; so that although several attempts have been made to establish collieries at these places, none of them have been successful, the cost and uncertainty of shipping having deterred vessels from coming here to load, when the harbors of the Sydney and Pictou coalfields were so much more safe and accessible; and the hope of all the collieries on this side of the island lies in the construction of a line of railway from the Strait of Canso northward. The following particulars respecting the work done at these mines are mostly derived from the reports of the inspectors of mines for Nova Scotia.

Port Hood Mines.—At Port Hood, in 1865, a slope was driven 300 feet northwest at an angle of 27°, by the Cape Breton Company, on the six feet seam, and in this and the two following years 8,503 tons of coal were sold from the mine. At distances of 50 yards on the slope, levels were turned on each side and working places won out. The boards were driven ten feet wide and pillars left six to eight feet thick and the full length between each level. The upper levels were driven from 500 to 300 feet, and the lower 150 feet in each direction. The seam varies a little in section as seen on different sides of the slope, and about 200 feet in each direction from it.

<i>South Level.</i>		<i>North Level.</i>	
Coal with bands.....	1 5	Coal, coarse.....	0 8
Slaty band.....	0 9	Coal, with partings.....	0 10
Coal.....	4 2	Coal, good.....	4 4½
	6 4		5 10½

No pillars have been worked. A short distance south of the slope, a shaft was sunk to the upper level. An adit from the shore was also connected with this level on the north side, and drained the mine to the extent of about 180 yards from the crop. A steam engine of 14 horse power was erected to pump and haul. The expenditure for 1866-68 was \$35,081.

* In the Report for 1879-80, page 116 F., 16 lines from bottom, "20th of April, 1879," should read "29th of October, 1879."

Tremaine's
mine.

North of the Cape Breton Company's slope 2,220 feet, and about 600 feet north of the lighthouse, a slope was driven in 1875 to win the coal on a sea area held by E. D. Tremaine and others, which reached the area at a distance of 478 feet on the pitch of the seam, where it had a minimum cover of 150 feet. Beyond 600 feet there was a sufficient cover of solid measures to permit a portion of the coal to be removed. The slope dips at an angle of $23^{\circ} 30'$ S. 85° W., is 10 feet 9 inches wide and 6 feet high, accompanied by a return slope. At a depth of 660 feet two levels were driven to test the seam, which obtained a good reputation as a house and steam coal. A hoisting engine of 26 horse power was erected, with a single 12-inch cylinder and 2 feet stroke, and a drum 6 feet in diameter, to which steam was supplied by two plain cylindrical boilers 30 feet long and 30 inches in diameter. In 1877 a few hundred tons of coal were taken from the pit, which was, however, closed in 1878 owing to an explosion of one of the boilers, and has not since been re-opened.

"The destruction of the bar which connected the mainland with Smith Island, exposing the harbor to the north winds, is a great drawback to the opening of any colliery at Port Hood. As the public wharf, 500 feet long, is fast silting up with the drift from the north, it is thought that sunken blocks, well ballasted, would with comparative quickness collect the drift, and that in this way the bar might be restored. The Cape Breton Company shipped outside the light, but the ice was very destructive to the wharf." *

Mabou Coal Mines.—Owing to the absence of a shipping place, and to the limited extent and faulted condition of the basin, no coal for other than local use has been extracted from the Mabou area, although the quantity in workable seams underlying one square mile is estimated by Mr. Brown at 27,000,000 tons.

Mr. Robb's
description.

Broad Cove Mines.—The extent of this coalfield is somewhat obscure, as well as the relation of the different seams to one another, but the quantity of coal underlying it is without doubt very large. The condition of this district in 1873 was described by Mr. Robb in the Report for 1873-74, page 182. In 1877 a level was driven westerly 100 yards, from the bank of the river below the bridge, in John McIsaac's, 2,500 feet from high water, above which the land rises and gives a lift of nearly 100 yards on the seam, the lower portion of which for 40 yards was opened by a second level used as a return air course. Between the levels headings were put up every chain. A small portable engine of 10-horse power is used at the mine. In 1879 an incline was started which cut the levels obliquely. The coal shipped

* Mr. Poole's Report for 1875.

was conveyed on a wooden tramway to the mouth of the river, where it was dumped into lighters, and from them transferred on board small vessels at anchor in the roadstead. The quality of the coal is fully equal to that from most of the Cape Breton mines; but in the absence of shipping facilities the owners of this mine can only hope for the construction of the railway to the Strait, or of an artificial harbor at McIsaac Pond.

Chimney Corner Mines.—Operations on a large scale were carried on at these mines between 1866 and 1873, at a cost of \$44,538. These were principally confined to the lowest seam, but in 1868 a drift was put in on one of the out-lying seams three feet six inches thick, and a few working places turned out of it. In the following year a slope was driven from the surface on the main seam, an engine erected for pumping and hauling, and other arrangements made to place the mine in a condition for shipping coal. This seam was proved by a series of pits for a distance of half a-mile, and on the same course pits were sunk at intervals for a distance of three miles from Chimney Corner Cove, and seams of coal exposed, which are the supposed continuation of the upper group.

The workings lie nearly altogether beneath the sea, but the roof being comparatively impermeable to sea water no inconvenience was felt. "If, however, the main slope were situated about half a-mile from the harbor, the thickness of the strata between each seam would admit of two or three seams being worked together, and the increased thickness of the roof would guarantee the security of submarine workings."*

In 1872 the main slope was 400 feet down, levels had been driven to the southeast 300 to 800 feet and working places formed. Another slope had also been connected with the workings for ventilation, and a tramway constructed along the face of the cliff to a shipping place. One of Cameron's special steam pumps, No. 6, kept the mine free from water. The shipments of coal were not large, and the destruction of the engine house and miners' dwellings by fire on March 3rd, 1873, brought the mine to a standstill, and it was not re-opened till Mr. Evans' return in July, 1882. The works are now again in partial operation, and it is hoped that coal will be shipped in the summer of 1883. Prior to the fire about 10,000 tons of coal are said to have been shipped to Nova Scotia, Prince Edward Island, and various places in the United States and Canada.

Professor Hind estimates the land area underlaid by the three upper seams at three-quarters of a square mile and the water area at

Professor Hind estimates of the quantity of coal.

* Professor Hind.

half a mile, assuming that the latter is thus limited by the syncline seen on the coast further south, and which is supposed to lie half a mile to the westward of the mine. The quantity of coal in these areas combined he estimates at 15,000,000 tons, or deducting half for pillars, waste, etc., 7,500,000 tons of available coal; and if the lower seams should prove as valuable as is supposed, this estimate must be greatly increased.

Coal of Bay St. Lawrence.

The "coal" of Bay St. Lawrence, on the shore at Burton's, near Salmon River, is a black bituminous shale, full of patches of limestone and silica, and containing traces of bright coal in seams. Associated with this are grey and bluish-grey shale and sandstone, which probably underlie the gypsum. The coal is of no economic value.

Peat-bogs of considerable extent, "capable of yielding an unlimited supply of that description of fuel of the finest quality,"* occur on all the barrens of the district, but particularly, as pointed out by Mr. Campbell, on those of the northern wilderness.

About a mile south of Mabou Harbor is a three-foot bed of peat with trees in it.

Lake Ainslie.

Petroleum.—From the circumstance that drops of oil ooze from the dark shale and sandstone on the shores of Lake Ainslie and spread themselves over the surface of the water it has long been believed by many that large reservoirs of petroleum, like those of Ontario and Pennsylvania, might exist in this neighborhood and be discovered by boring. Within the last twenty years, consequently, several companies have been organized for the purpose of testing this question, but have met with bitter disappointment.

In 1874 two boreholes were put down, the first of which it is said gave indications of oil, but was lost at a depth of 650 feet by the breaking of the rods. The second hole was put down to a depth of over 900 feet. Altogether some \$20,000 were expended.

Baddeck River.

Several years later numerous holes were sunk both on the eastern and western sides of the lake, to a depth, it is said, of 1,100 feet, and also at McRae's bridge near Baddeck. Engines and derricks were erected and upwards of \$100,000 expended in the two years 1880 to 1881 † with no other result than to prove the probable groundlessness of the belief in the existence in paying quantity of the petroleum, which is contained apparently only, in small quantity, in the highly bituminous rocks of the neighborhood, as at Gaspe and Memramcook, New Brunswick, where similar trials have been made.

Result of borings.

Iron Ore.—Further explorations have been made in Cape Breton

* Campbell's Goldfields of Nova Scotia, page 8.
† Report of Commissioner of Mines.

county and elsewhere by persons interested in the contact deposits of red hematite; but no mining has yet been done. A specimen of hematite from the head of Loch Lomond, analyzed by Mr. Adams* yielded 64.494 per cent. of metallic iron, .034 of phosphorus and .078 sulphur. On Philip McDonald's farm, boulders of iron ore weighing 1,000 lbs. are said to have been found. At Archibald McVicar's, an opening has been made in a bed of red hematite near an outcrop of grey granular felsite.

Mr. Moseley has still further developed the deposit between East Bay and Boisdale, † and the bed in the eastern opening is now 13 feet thick. ‡

Between the head of Forks Lake and East Bay, in Smith Brook, red hematite was exposed in some trenches cut across beds of purple and dark felsite and bands of clay. It is apparently in lenticular veins following the stratification in a general way, seldom exceeding three or four inches in thickness and said to contain a large percentage of phosphoric acid and manganese dioxide. Between Smith Brook and Macbeth's there is a vein of micaceous iron ore varying in size from a foot downward, in a dark soft belt in the felsites on the side of the mountain.

Very fine specimens of specular iron ore and red and brown hematite are found on Donald Campbell's land, Lewis Mountain, but apparently only in small veins. Hematite also occurs in vugs in felsite a few hundred yards below the grist mill on Lewis Mountain road.

The Gairloch Mountain iron ore is described on page 5. An analysis § shows it to contain 69.295 per cent. of metallic iron. Mr. Evans mentions the occurrence of specular iron ore at Lake Jaw. Mr. John McLeod of Big Intervale, Margaree, showed us specimens of red hematite said to have been found in the vicinity. Many of the rocks in other localities contain these ores in traces. The red syenite of the Middle Aspy River contains hematite in the joints, often associated with talc so as to become soft and soapy. Hematite is stated to occur between Cape Rouge and Pleasant Bay.

No further test has been made of the extent and quality of the iron ores of Whycocomagh, described in the reports for 1873-74, page 180, and 1875-76, page 415.

A deposit of specular iron ore has been worked to some extent near the shore of Robinson Creek, at the western line of the Indian Reserve in Richmond county, by Messrs. Joseph Matheson, of L'Ardoise, and

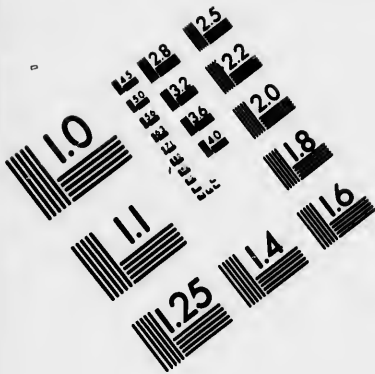
* Report for 1880-81, page 7 H.

† Report for 1877-78, page 28 F.

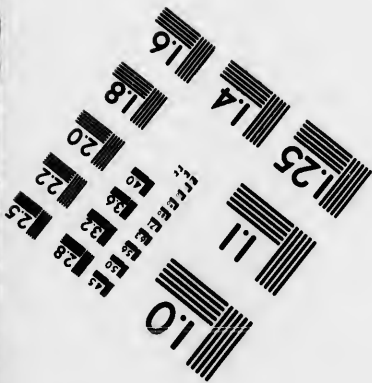
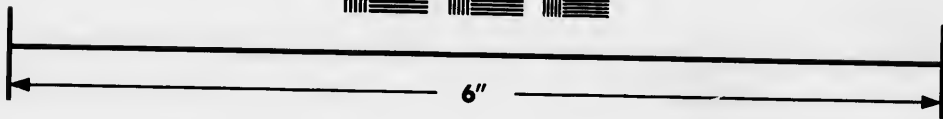
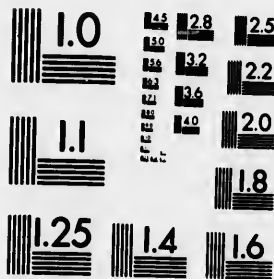
‡ Mr. Gilpin. Report of Commissioner of Mines for Nova Scotia, for 1881, page 15.

§ Report for 1879-80, page 14 H.





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Salmon River Indian Reserve. John Morrison, of St. Peters. The ore has been extracted from pits, several hundred feet apart, near the limestone of that vicinity, which also contains calcespar veins holding traces of copper pyrites. But the relation of the ore to the surrounding rocks is obscure, and its occurrence is perhaps, like that of Guysboro county, dependent on the intrusive rocks of the neighborhood. Specimens were presented to the Geological Museum by Mr. Paint, M. P. The result of a partial examination of this ore will be found in Mr. Hoffmann's report (p. 17 и и).

Magnetic Iron Ore is found in the sand of nearly all the beaches, but more especially on those of Aspy Bay, Ingonish and St. Ann's, and is said by Mr. Campbell to be abundant at some points between Pleasant Bay and Cape St. Lawrence. Near McKinnon Intervale a large block of labradorite, 12 by 10 by 8 feet, which is to all appearance a boulder, contains blotches and streaks of magnetic iron ore. In a pit near it the parent rock is said to have been found by Mr. James McKenzie of Sydney, but to the south and north plaster occurs. Blocks of similar felsite were also seen in the roads and fields of the vicinity.

Titaniferous Iron Sand was found in the washings in the Middle River goldfield.

Manganese Ore.—Large deposits of pyrolusite, which promise to be of great importance, have recently been discovered and developed by the Hon. E. T. Mosley of Sydney on the south side and near the head of Loch Lomond in Cape Breton county. The ore is associated with lower Carboniferous rocks and has been worked in two places about three-quarters of a mile apart. At the most easterly of these, in a brook on the farm of Norman Morrison, a tunnel has been driven about 30 feet on a vein about 7 inches thick, dipping N. 87° W. < 25° in red fine sandstone overlying reddish and greenish grit, with grains of quartz about the size of wheat, and red marly sandstone. The ore is irregularly mixed with red and grey bituminous limestone, red and greenish shale, conglomerate and other rocks, blotched with calcespar. It is in lenticular layers and also intimately mixed with the limestone, being probably of the same nature and origin as the hematite and forming at times a cement for the pebbles of the conglomerate.

Loch Lomond.
Morrison mine.
McCuish mine.
Yield.

At the western or McCuish mine the ore shows in streaks in a red marl or sandstone dipping S. 80° W. < 32°. A number of bands of ore in a belt here occupy the bedding-planes of a bright-red argillaceous shale. The main seam is generally overlaid by red, calcareous, argillaceous shale and limestone, while conglomerate lies below and is also found in thick beds in the adjoining brook. At one point a lenticular band of dark conglomerate comes between the shale and the ore.

These mines were first worked in 1880. In 1881 about 70 tons and in the following year 59 tons of excellent ore were shipped to the

United States where it is applied to the preparation of chlorine used in the manufacture of bleaching powder, to decolorizing glass and other purposes. It is very free from iron, and remarkably pure. An analysis of a sample from the Morrison mine afforded Mr. Adams* 91.84 per cent. of manganese dioxide, only 12 per cent. of ferric oxide and 2.91 per cent. of insoluble residue. Other analyses are given by Mr. Adams, but without mentioning from which mine the samples come, in the Report for 1879-80, page 17 H. Owing to the recent great rise in the price of manganese, these mines will, it is hoped, prove exceedingly remunerative; and it is not improbable that, associated with similar strata in other places, deposits equally rich will be discovered. Mining is conducted by open quarrying and tunneling, and it is the intention of Mr. Moseley to erect an engine for pumping and other purposes.

Samples of bog manganese from Big Harbor, Boulardrie Island, have been analyzed by Mr. Adams,† the best of which was found to contain 25.42 per cent. of manganese dioxide and 33.52 per cent. of water.

Galena.—As already remarked, many of the lower Carboniferous limestones hold traces of galena, but the attempts frequently made to develop some of the most promising have resulted only in disappointment. On the hill at D. Norman McVarish's, Southwest Margaree, one of these limestone strata is full of minute veins of calespar and quartz, holding minute traces of galena. At Pleasant Bay, near the mouth of Mackenzie River, grey quartzose grit with patches of greenish and reddish fine sandstone, is associated with a dark-grey and brownish, highly bituminous, limestone, with calespar veins. The veins hold galena, which is also disseminated in the limestone and grit. These rocks do not extend far inland, but are surrounded by the underlying gneiss. The galena occurs chiefly in two veins 5½ and 3 feet thick respectively, and a shaft 15-20 feet deep has been sunk in each. The galena contains both silver and gold, and is associated with copper pyrites. At the mouth of the river copper pyrites and galena appear in specks with iron pyrites and fluorspar in the strings of white quartz which penetrate the syenite and granite. Professor How mentions bitumen also as found in the calcite of this locality. The "mine" has been known for many years and a large sum of money spent in exploring it.

In Cape Breton county, near the head of Loch Lomond, small pits have been sunk in massive grey limestone containing fossils. A minute quantity of galena is disseminated in it as small grains. In a large brook between this point and Mira River is a dark breccia,

* Report for 1881-82, page 12 H.

† Report for 1881-82, page 12 H.

probably one of the basal beds of the millstone grit, containing large fragments of compact felsite, bound together by a rusty calcareous cement containing galena. Some of the layers for a thickness of four feet have been mined and several tons of ore extracted. A specimen analyzed by Mr. Adams* yielded 2.879 ounces of silver to the ton, the galena constituting but a small proportion of the whole.

A small vein containing galena, of no commercial value, was also found in the sandstone of the coal measures at Port Hood, between two seams of coal, and traces of galena also occur in the Pre-Cambrian rocks as in Cheticamp River.

Some further desultory work has been done at the North River of St. Ann's at the mine.† In the workings the vein now dips N. 83° E. < 30°, and carries calc spar, varying from 1 foot 7 inches downward, but where thickest it is barren and split by bands of the country rock. In one place it is six inches thick and contains three quarters of an inch of galena, but generally the galena is mixed with yellow and purple copper ore, or sometimes nearly replaced by black blende.

Further explorations in the veins in the syenite of the Barasois River‡ have not led to an improvement in their prospects, the largest being less than six inches in thickness. In some places, however, the vein consists almost entirely of pure galena, while in others copper pyrites is present.

Copper Ore.—The wide dissemination of traces of copper ore among the Pre-Cambrian rocks in the Carboniferous conglomerate at its contact with limestone, and also in the associated igneous rocks, lend strong confirmation to the opinion that notwithstanding the many failures hitherto, to find a workable deposit, such will yet be discovered.

In a branch of Brigend Brook, near Whyecoomagh, Mr. Duncan McDonald found a vein of quartz containing, it is said, copper pyrites with traces of gold and silver; and some mining was done in it. In Campbell Brook is a vein from four to six inches thick, traceable for several feet. It contains copper pyrites, which is also found in some of the felsites of the neighbourhood.

In a brook flowing into the Great Bras d'Or, east of Big Harbor (Port Bevis), a pit has been sunk in a diorite containing quartz veins, from which a little copper ore and galena were extracted. On the shore of St. Ann's Harbor, inside the beach and opposite Englishtown, the cliffs of dark purple porphyritic and epidotic felsite contain irregular lenticular veins of calc spar and quartz, seldom exceeding three inches. These hold copper pyrites, galena, hematite, etc., and have been to

* Report for 1881-2, page 12 11

† Report for 1876-7, p. 452.

‡ Report for 1876-77, p. 452.

containing large rusty calcareous thickness of four feet. A specimen of the ton, the value, was also Hood, between the Pre-Cambrian

North River of low dips N. 83° strikes downward, the country rock, the quarters of an inch with yellow and black blende.

of the Barabois beds, the largest, however, the others copper

per ore among moderate at its base rocks. Found in the any be discovered. Mr. Duncan copper pyrites alone in it. In traceable for found in some

of Big Harbor quartz veins, On the shore of Pictou, the main irregular three inches. have been to

some extent tested by Lieut.-Col. Bingham, Judge Tremaine, and others, whose enterprise deserves to be successful.

For some years prior to 1865 a company was engaged mining for Cheticamp. copper ore at Cheticamp, and in 1864 about 12 men were employed. A shaft was sunk to a depth of 106 feet and connected with an adit 410 feet in length. An air shaft, 30 feet in height, was also cut from the adit level to the surface of the ground. But not proving productive the works were discontinued.* They are situated in the vicinity of the trap and sandstones of the base of the Carboniferous. Professor How mentions that green and blue carbonate of copper, grey and yellow copper ore in calcite, and chrysocolla are found at Cheticamp, probably at this mine, or in that at Jerome Brook, as well as perfect crystals eight inches long, of red felspar, in the Pre-Cambrian syenite of the neighbourhood.

Further north, on the coast near Jerome Brook, pits have been sunk in a dioritic rock showing an irregular vein of calcspar, quartz and baryte, containing yellow copper ore, changed into green carbonate on the surface. In places this vein is more than a foot thick, but in others it thins out entirely and takes up again on the strike of the diorite. Higher in the cliff are blotches and vugs full of crystals of quartz associated with copper ore and magnetite. The deposit resembles that of St. Ann's and gives little promise of persistence. In the traps of this neighbourhood native and vitreous copper, together with the rare zeolite, poonahite, are reported by Professor How to occur.

North of Cheticamp, copper ore is seen at Poulet Cove, near Poulet Cove, Money Point, and elsewhere, about Cape North. Traces are also found in McLean and Stewart Brooks, in the Big Intervale of Margaree, but Margaree, none of economic value.

A shaft was sunk 75 feet on the Eagle Head copper ore in 1880 and a considerable quantity taken out.†

Mining has been vigorously prosecuted at the Coxheath copper mine since 1878, the property having passed into the hands of an American company. The tunnel referred to in the Report for 1879-80, page 123 F., was driven about 35 feet, but not far enough it is thought to cut the bands of rock carrying the ore. Long costeering trenches were then cut and a shaft sunk about 50 yards upstream from the tunnel, which passed through some excellent bands chiefly of purple ore, accompanied by a considerable quantity of iron pyrites. About 1,000 feet above this shaft another was sunk 15 feet in the brook, from which fine specimens of yellow copper ore were taken. About 700

* Report of the Commissioner of Mines for Nova Scotia.
† Reports for 1875-76, page 415, and for 1877-78, p. 20 F.

feet further up the brook in the same belt ore was again found, and in many small pits in the neighbourhood. During the last two years mining operations on a much larger scale have been carried on. Two shafts, 1,000 feet apart, have been sunk to a depth of 156 and 140 feet, and in the autumn of 1882 were furnished with hoisting engine, steam pump and power drills and a Blake crusher. A blacksmith's forge, store, laboratory, engine houses and other buildings have also been erected. In the main shaft, at a depth of 120 feet from the surface, a crosscut was driven and cut the ore three feet from the shaft, but was continued about 80 feet in the hope of cutting a parallel lode. The ore was drifted on and a little stoped out. Twenty feet lower, drifts were pushed east and west, nearly 80 feet in each direction, showing, it is said, a large quantity of paying ore. In the east drift a winze was sunk 30 feet. In addition to copper the Coxheath lode also carries silver. Two assays, by C. T. Lee, of samples of the ore yielded:—

Buildings and machinery.

Silver,	35	oz. per ton:	Value.....	\$ 38.50
Gold,	$\frac{1}{4}$	" " "	".....	4.13
Copper,	20 $\frac{1}{2}$	per cent. per ton:	Value.....	60.00

Composition of ore.

Total value.....\$102.83
Lead—a trace. Arsenic—none.

Silver,	73	oz. per ton:	Value.....	\$ 80.30
Copper,	21	per cent. per ton:	Value.....	63.00

Total value.....\$143.30

Prof. R. H. Richards, of the Massachusetts Institute of Technology, assayed a sample of chalcoppyrite, galena and quartz, which yielded:

Silver,	56	oz. to the ton:	Value.....	\$ 61.60
Copper,	15 $\frac{1}{15}$	per cent. to the ton:	Value.....	45.30

Total value.....\$106.90

The explosive used is principally dynamite, of which two and a-half tons were laid in last fall for the winter's use. The blasts at both shafts are exploded by electric batteries. Mr. H. C. Burchell, C. E., is the manager of the mine, while the company's consulting engineer is Mr. T. W. Revere.* It is to be hoped that the energy and capital thrown into this enterprise will not be wasted.

Gold has been supposed to occur in various parts of the Great Bras d'Or and Little Narrows; and fruitless search has been made for it. At Charles McLellan's (tanner), Broad Cove Chapel, a pit was sunk 25 feet in the hope of finding gold associated with the iron pyrites in a

Great Bras d'Or.

* Cape Breton Advocate, March 22nd, 1883.

bluish-grey argillaceous shale. About 20 years ago the existence of gold in the sand of many of the rivers was noticed by Mr. Campbell, who mentions particularly the Middle, Long Point, Northeast Margaree, Baddeck, Fisset, Cheticamp and Cape Rouge Rivers. But in only the first of these has gold been found in sufficient quantity for working, although Mr. Campbell found the sand of the Northeast Margaree nearly as auriferous.

Mr. Campbell's
explorations.

Middle River has been proclaimed a gold district by the Government, but is unlike the other districts of the mainland in the mode of occurrence of the gold in the veins and surrounding rocks. A farmer named Morrison, living in the neighborhood, was the first to call the attention of the Government to the gold found in the district, for which he received a free grant of an area on one of the brooks, and became one of the most successful in washing out gold.

The first attempt, on an extensive scale, to test the gold in this river was made by an American company in 1867. They commenced operating sluices and other apparatus, with which they washed during the entire summer, and obtained, as I am informed by Mr. Aloxander Wright, of Moneton, a considerable quantity of gold and several barrels of black (magnetic) sand.* However, as the expenditure exceeded the receipts, they did not continue their search, although it was shown that at this point, as well as for some miles upstream, every panful of gravel yields particles of gold.

In 1870 Mr. Wright and others tested by cradles, sluices and pans, in the same way, all the brooks above McLennan's bridge, finding gold in all those on the left bank. They also sunk a shaft in the main river with the view of reaching the bed rock, but an influx of water stopped the work. The largest piece of gold found is said to have been worth \$12 or \$15, but generally the nuggets ranged in value from fifty cents to \$2. In several cases the gold was found adhering to quartz, although it was not found in any of the quartz leads of the neighborhood. Notwithstanding all the favorable indications no results proportionate to the outlay seem to have been obtained since the region was proclaimed a gold district, although numerous companies and individuals have at various times, sought for gold in this region. It may be that the proper appliances and an intelligent determination to test thoroughly the value of the district were wanting.

Size of nuggets
found.

Silver.—Mr. Campbell states that native silver in nuggets, in the surface drift and in strings and nests in sparry veins, occurs in the Mackenzie River.

Mackenzie
River.

* Titaniferous iron sand according to Prof. How, who also mentions nuggets of bismuth up to the size of a pigeon's egg among the washings.

Limestone is found in abundance in all the Carboniferous areas, and is quarried for local use.

Baddeck
quarries.

Gypsum.—The only quarries from which gypsum is exported are those at the head of Baddeck Bay and Big Harbour (Port Bevis), already described.† This is owing to their great facilities for shipping and to the excellent quality of the gypsum.

Bricks.

Clays fit for the manufacture of bricks occur in many places. White, red and brown clays are found at the south bay of Ingonish, and a reddish variety in the Skye River, near the schoolhouse, at Indian Rear. Bricks are made at Southwest Margaree and Lake Law. *Fireclay* occurs in connection with the coal seams at Chimney Corner, Broad Cove and elsewhere.

Building Stone.—Sandstones fit for building are confined chiefly to the coal measures and lower Carboniferous. They are quarried for local use at Southwest Margaree, Broad Cove, Cheticamp, Whyccomagh, Southwest Mabou and Pleasant Bay.

Marble.—Limited patches of marble have been frequently stated, in the course of this report, to exist at Whyccomagh, Middle River, St. Ann's, Ingonish, and elsewhere. Between Cape North and Bay St. Lawrence is a white point said to consist of crystalline limestone.

† Report for 1875-76, p. 417.

